AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

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Contents

Gas-Tax Tolls Continue to Mount. By Norman G. Shidle 645
Just Among Ourselves 647
Three Budget Compasses Give SKF Industry Smooth Sailing. By Joseph Geschelin 648
Continuous Gas Carburizer Used by Chrysler on Steering Worms. By E. A. Thomas 652
Sam Miles Dies in England; Whole Industry Mourns 655
Blocks Measured Quickly on Production Line .. 657
Electrochemists Discuss Light Metals, Plating and Electromelted Iron 658
Production Lines 660
Willys Drops Warsaw Post; Returns in June to Battlefront in Toledo 661
Diesels With Precombustion Chamber Meet Broad Operating Problems. By Andrew Hornung 662
Automotive Oddities 666
News of the Industry 667
Calendar of Coming Events 672
New Developments 676
Advertisers' Index 50-51

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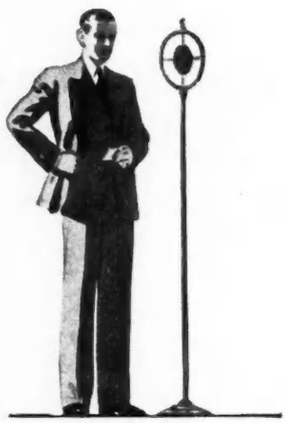

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AUTOMOTIVE INDUSTRIES

Vol. 66, No. 18 • THIRTY-THIRD YEAR • April 30, 1932

Even Loyal S. Graham, who in 1919 drafted the original gasoline tax measure for Oregon, says, in 1932: "To burden gasoline with unreasonable taxation is dangerous, as it may destroy a source of much revenue. No single product can stand exorbitant taxation." Mr. Graham's words find an echo in the recent opposition to a proposal for a Federal tax on gasoline.

by Norman G. Shidle

State Gas-Tax Tolls Mount; Confiscation-Point Imminent

AMERICAN motorists this year are using less gasoline than they did in 1931. For the first time in many years, total car and truck mileage bids fair to show a decline.

Result? Vehicles wearing out less quickly, fewer repairs, smaller sales of replacement parts, less profit for the car dealer, less profit for the independent repair shop, and less profit and pleasure for the motorist.

Constantly rising gasoline taxes unquestionably have been playing an important part in generating these results, unfavorable to the automotive retailer and manufacturer at any time and particularly menacing during a period of depression.

Increasing state levies on gasoline and threatened national taxation of motor fuel thus have become real threats to the very existence of thousands of units in this greatest of manufacturing industries. Not until the present depression was well on its way, did the dire economic effects of excessive taxation of gasoline begin to show up in acute form. Why?

Several reasons appear readily upon analysis:

1. Despite increasing taxation the price of gasoline has declined steadily for many years. Technical advances by the petroleum industry thus far have been more than offset by rising tax rates per gallon. The end of that road has about been reached.

2. Differences of a few cents a gallon made little if any difference in the number of miles run by the average car owner. Today it is different. Thousands of car owners must count pennies as they ride or put up their cars entirely because they can't afford to operate cars already owned.
3. Average taxation of gasoline in the various states is about 4 cents per gallon now. That is nearly equal to the average production cost. Taxes of nearly 100 per cent are being levied on gasoline now!

Only the prejudiced and the foolish would attempt to lay at the door of excessive gasoline taxes a major portion of the reduction in car use which has been taking place recently. But these taxes, totaling last year in excess of $525,000,000 when augmented by the $355,000,000 collected from motorists in license fees and by the added millions which this year will be taken by the National Government in sales taxes, unquestionably provide a barrier of some real importance to the maximum use of motor vehicles of all kinds. Motor vehicle taxation in general and gasoline taxes in particular, in other words, have been made by the depression to assume the character of dire menaces to automotive prosperity in a very real and practical sense.

And, as pointed out by Victor Scales in *Automobile Trade Journal* last month, the published figures of taxes collected by states from gasoline levies are much smaller than the actual total paid by motorists due to the widespread bootlegging which has been made profitable through the excessive taxes. It is worth emphasizing again the main point made in that article, namely that when any tax is increased to a point where profit is to be made from evading it, that tax will be evaded. Gasoline taxes have long since reached that point.

Gasoline taxes in their present size and utilization now have only a remote connection with the purpose and bases of the original gasoline tax measures. This is an important point not sufficiently recognized.

As originally conceived, the gasoline tax was to raise revenue for building and repairing of highways. It was collected directly from those using the highways most and was considered by practically all legislative elements as a sensible and satisfactory means of raising revenue for that purpose. It was paid by motorists almost without protest because they could see a direct return in good roads received. Now gas tax revenues are being applied to a great variety of other state expenses in many instances.

The original tax was one cent a gallon, levied in Oregon in 1919. Today five states levy a tax of 2 cents, 11 a tax of 3 cents, 16 a tax of 4 cents, 10 a tax of 5 cents, 1 a tax of 5½ cents, 4 a tax of 6 cents and 2 a tax of 7 cents.

Here's what Loyal S. Graham, drafter of the original gasoline tax measure, has to say about present gasoline taxation in February, 1932:

"To burden gasoline with unreasonable taxation is dangerous, as it may destroy a source of much revenue. No single product can stand exorbitant taxation. . . . I believe that the limit has been reached and that we should discourage grasping for more. Because it has worked is no reason for riding a free horse to death. I am opposed to a Federal tax on this product. . . . . Let well enough alone."

The very presence of the proposal for a Federal tax this year, together with a continuance of threats to increase state taxes, renders important to the fight which is being put up against this Federal tax measure.

The case against the Federal tax was summarized brilliantly and concisely in the statement made by J. Howard Pew, president, Sun Oil Company, before the House Ways and Means Committee early this year. Mr. Pew said in part:

"This country is now in the midst of a depression, and many people believe that the automotive industry may be expected first to recover and to lead in general economic improvement. What, then, could at this time more effectively discourage the motorist and the motor industry than for the Federal Government to start taxing gasoline? Every motorist would begin to vision the possibilities of a tax, not of 1 cent, but of 5, 10 or even 15 cents. The average weighted wholesale price of gasoline at principal refining centers is now about 5 cents per gallon. State tax averages about 4 cents; add 1 cent Federal tax and you have doubled the cost. Surely such a tax is little short of confiscation.

Gasoline Tax Not a Luxury Tax

"This tax alone means $30 a year to the average motorist, to the workman who uses his car of a necessity.

"But it is sometimes urged that high gasoline taxes can be justified as luxury levies. The argument will not bear analysis. People in the industry know that fully 50 per cent of gasoline is used for strictly industrial and industrial transportation purposes. Of the remainder, fully half is for routine transportation of people in connection with their business.

"In the open country, where distances are considerable and the motor vehicle has become the accepted mode of transportation, the luxury argument has no standing at all. And as to the cities, I wonder how many of us realize how impressively the mode and fashion of life, the distribution of populations, have been revolutionized by the motor car? In all the great cities the people have been deserting the congested central areas, moving out to the suburbs and country.

"Neither on the ground that this is a luxury tax nor on that of the exigent necessity for revenue can you justify such a tax as is here proposed. Gasoline is

(Turn to page 674, please)

JUST AMONG OURSELVES

The Theme That Sells

HOPE of sales in the next three months depends on ability of salesmen to sell automobiles to people who still have money. That's why the salesmanship based on the idea that "a new car is a badge of honor" continues to be of major importance. Of all the ballyhoo campaigns suggested since the beginning of the depression, this one has a basis in sounder economics than any of the others. It proposes that we concentrate on getting into the market those known to have money and that we concentrate in our selling on overcoming one of the major psychological barriers to buy on the part of just those people, namely, the fear of their neighbor's ill-will should they appear in a new automobile at this time of hardship.

It's Up to the Automobile

NEW changes on this idea are rung in interesting style by H. Bertram Lewis, Commercial Credit v.p., in a special issue of his "Automotive Observations" just off the press.

Starting with the idea that "America's one hope of beginning a large scale industrial comeback during 1932 rests with the automobile dealer," Lewis adds: "If we succeed, America moves ahead and gives the whole wide world a lift in doing so. If we fail, the status quo remains. But at least, we shall have had the satisfaction of putting up a fight that mankind will thank us for."

Then, getting down to the badge of honor idea, he has written these expressive sentences:

"People who can afford new motor cars and have a right to buy them must be made to feel sincerely that money spent in that way is not treason but practical charity . . . .Give we must and will while the need exists but only intelligent spending can cure the need."

Protection Goes Astray

PROTECTIVE tariff in the United States was designed originally to protect young industries. Now the government seems to single out the young industries as the chief targets for excise taxes. Automobiles, electric refrigerators, radios . . . . so goes the list. Looks like the young industries need protection from home influences as much as from foreign.

Parts Makers With Ears to the Ground

ALERT parts makers and machine tool builders are destined to play big parts in development of 1933 car and truck models. Last year more design and research work was thrust by vehicle engineers on the technical men of the parts companies than ever before. This year the process will go further. Factory forces are still being reduced at a number of vehicle plants, and so long as this process continues opportunity will knock louder and louder on the doors of the parts and factory equipment producers.

Orders will go with ideas and service as never before. And orders for 1933 are going to mean good volume—very good volume if measured in terms of 1932.

And the New Ford Eight Is—

BEST information we can get indicates that Ford is still a long way from quantity production and that some changes in design of the new V8's are still being made. Many of the wild rumors circulated on the subject unquestionably are untrue. In the meantime Plymouth and Chevrolet and others are demonstrating and selling automobiles, getting advantage of the opening of the spring buying period.

Ford will sell a lot of automobiles as soon as he is able to deliver, no matter what time of the year it may be; no matter what kind of weather. But failure to demonstrate and deliver in the spring will mean the loss of many sales which otherwise would have been made, just the same.

Ain't This Sompin!

AVERAGE tire cost in 1932 is 59c per 1000 miles to the motorist who buys new tires, according to S. B. Robertson, Goodrich vice-president. This compares with $5.67 per 1000 miles in 1914, he says. The motorist, at least, seems to be getting a good break out of the tire business.—N.G.S.

Three Budget Compasses Give SKF Industry Smooth Sailing

by Joseph Geschelin

Last year the Hess-Bright Mfg. Co., an SKF subsidiary in Philadelphia, saved 30 per cent on its maintenance-expense account and 15 per cent on its indirect-payroll account. A concrete explanation of how this achievement was accomplished is found in the story below

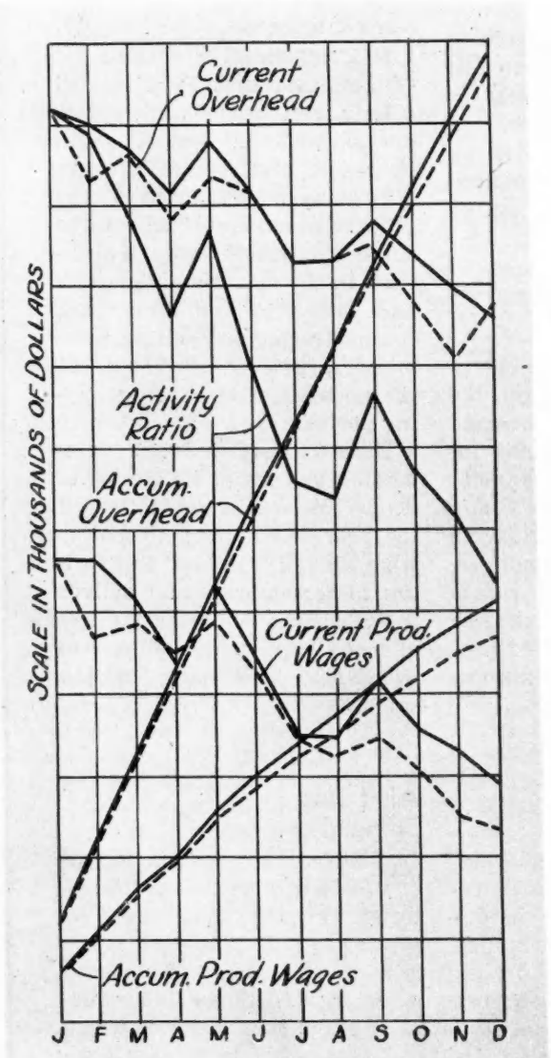

Current Overhead
Activity Ratio
Accum. Overhead
Current Prod. Wages
Accum. Prod. Wages
SCALE IN THOUSANDS OF DOLLARS
J F M A M J J A S O N D

Fig. 1—Can variable operating costs be controlled? They were at Hess-Bright as this chart shows. Heavy lines are the forecast; dotted lines mark an actual improvement on every promise

ANY works manager who wrestled with a factory budget in the year 1931 can tell you it was a tough battle. Time was (and sadly enough still is, in some plants) when overhead, like taxes, was accepted as an unavoidably growing evil nourished by profits and dividends. Today, one of the main differences between a "coming" and a "going" concern, at least in our swiftly paced industry, lies in its method of controlling the overhead of the manufacturing division.

We have had the privilege of studying the workings of the SKF Overhead Budget Control in the plant of the Hess-Bright Mfg. Co., a subsidiary of SKF, where it has served under the handicaps of trying business conditions. How this control fared, as well as a good estimate of its latent possibilities, may be gaged from the striking picture offered in Fig. 1, which formed a part of the report submitted to the management at the end of the year.

Heavy lines chart an optimistic forecast, month by month, of budgeted activity. Dotted lines below show what actually happened. Without this evidence, it would be hard to believe that current payrolls could follow so faithfully the peaks and valleys of activity. That the same could be done with current overhead is certainly bordering on a long-sought-for ideal.

Now just two cost figures to illustrate another angle. Comparison with the previous year shows a saving on two accounts alone as follows:

Maintenance	30 per cent
Indirect payroll	15 per cent

Those concerned with management responsibility can readily appreciate that something of the unusual in organization, coordination, and planning, underlie such achievement. And it is our object to go into these details as completely as space permits.

As the writer began to see the mechanism of this control system in its true perspective, two distinct features seemed to eclipse the purely mechanical parts of it. The first of these is what we usually call "intangibles"—really the human element. In the words of the comptroller, "the operation of the budget for the past year has created a feeling of 'cost consciousness' on the part of all department heads which cannot be expressed in terms of dollars and cents, but is

BUDGET DETAILS VARIOUS ACTIVITIES

DEPARTMENTAL EXPENSE ACCOUNT ANALYSIS SHEET

DEPARTMENT NO.

A/C No.	ACCOUNT NAME	10%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%	105%	110%	115%	120%
702A	Salaries																						
A1	Salary Transfers																						
B	Non-Prod. Wages																						
5	Liability Insurance																						
7-8	Supplies																						
83	Supper Money																						
9	Miscellaneous																						
21	Power																						
22	Gas																						
28A	Repair Equipment																						
B	" Machinery																						
C	" Testing Apparatus																						
D	" Countershaft																						
	TOTAL—MCHY. REPAIRS																						
29A	Repair Motors & Gen.																						
B	" Lineshafting																						
B1	" Belting																						
C	" Trans. Equip.																						
	TOTAL—TRANS. EQUIP. REP.																						
30A	Repair General Tools																						
B	" Meas. "																						
C	" Misc. "																						
	TOTAL—TOOL REPAIRS																						
31A	Repair Off. Furn. & Fix.																						
B	" Factory Furn. & Fix.																						
	TOTAL—FURN. & FIX. REP.																						
32	Repair Patterns																						
33	Repair Auto & Trucks																						
37	Re-erect. Equipment																						
39	Trucking																						
40A	Operation Inspection																						
B	Floor Inspection																						
41	Clean & Oil Machinery																						
42	Waiting Time																						
53	Shop Clerical Expense																						
54	Shop Attendants																						
55	Oper. Instruction Exp.																						
56	Insp. Purchased Material																						
74	Spoiled Work																						
79	Telephone & Telegraph																						
82	Advertising																						
84	Stationery & Printing																						
85	Postage																						
86	Traveling Expense																						
99A	Restaurant Income																						
B	" Expense																						
	SUB TOTAL																						
	Rent																						
	Depreciation																						
	GRAND TOTAL DIRECT EXP.																						
Totals	Productive Wages																						
	Productive Hours																						

Exhibit A

OVERHEAD EXPENSE BUDGET

Dept No. % Activity Month

Acct.	Description	ITEM OF EXPENSE THIS MONTH Budget	Actual	Budget Over or Under (Red)	YEAR TO DATE Budget	Actual	Budget Over or Under (Red)
702-a	Salaries						
702-b	Non-Prod. Wages (Und.)						
5	Liability Ins.						
7-8	Supplies (Und.)						
9-a	Supper Money						
9	Misc'l Dept'l Exp.						
21-22	Power and Gas						
28	Repairs—Machry.						
29	" —Motors, Etc.						
30	" —Tools						
31	" —Furn. and Fix.						
32-33	" —Patterns—Autos						
37	Re-Erect Equip.						
39	Dept'l Trucking						
40	Oper. and Floor Insp.						
41	Clean and Oil Machry						
42	Waiting Time—Wages						
48	Reconstruction Exp.						
49	Inventory Exp.—Wages						
51	Rust Exp.						
52-a	Scrap—Income						
52-b	" —Expense						
53	Shop Clerical Exp.						
54	" Attendants						
55	Oper. Inst. Exp.						
56	Insp. Purch. Mat'l						
57	Factory Exper. Exp.						
61	Disassem. Exp.						
68	Gen'l Expense						
70	Welfare Exp.						
73	Trans-Haul., Demurrage						
79	Tel. and Tel.						
84	Stationery Cons.						
85	Postage						
99-a	Restaurant—Income						
99-b	" —Expense						
	Rent						
	Depreciation—Equip.						
	Totals						
	Productive Wages						
	Serv. Dept. Wages — Exp. a/cs / Other a/cs						
	Productive Hours						

Exhibit B

THE HESS-BRIGHT MANUFACTURING COMPANY

WORKS OPERATING REPORT

COMPARATIVE ACTUAL WITH BUDGET

MONTH ENDING

Acct. No.	Account Name	ACTIVITY RATIO This Month Budget	Actual	Budget Over or Budget Under	YEAR TO DATE Budget	Actual	Budget Over or Budget Under
702A	Salaries						
B	Non-Prod. Wages						
5	Liability Insurance						
7 & 8	Supplies						
9	Miscellaneous						
	Supper Money						
	Spoiled Work						
	Advertising Expense						
21	Power						
22	Gas						
28	Repairs—Machinery						
29	Motors						
30	Tools						
31	Furniture and Fixtures						
32	Patterns						
33	Autos—50%						
37	Re-erect Equipment						
39	Trucking Expense						
40A	Operation Inspection						
B	Floor Inspection						
C	Re-inspect from Stores						
41	Clean and Oil Machinery						
42	Waiting Time						
46	Dispensary Expense						
48B	Reconstruction Expense						
49	Extra Cost of Taking Inventory						
51	Rust Expense						
52A	Scrap—Income						
B	Scrap—Expense						
53	Shop Clerical Expense						
54	Shop Attendants						
55	Oper. Instruction Expense						
56	Purchased Material Inspection						
57	Experimental Expense						
61	Disassembly Expense						
68	General Factory Expense						
70	Welfare Expense						
73	Transportation Expense						
79	Telephone and Telegraph						
88	Admin. Ex. Chargeable to Cost						
84	Stationery and Printing						
85	Postage						
99A	Restaurant Income						
B	Restaurant Expense						
	Gross Overhead to Work-in-Process						
	Productive Wages						
	Productive Hours						
	Gross Overhead Ratio—Prod. Wages						
	Gross Overhead Cost Per Prod. Hour						

Exhibit C

Fig. 2 — These are about the only important forms that are needed to keep the system going. See text for an explanation of each one

nevertheless an important factor in overhead costs control." And so it is, according to the experience of many works managers with whom the writer discussed the subject from time to time.

In the first place, the budget sets a definite par on accomplishment—a mark for the foremen to shoot at. Add to this the fact that the foreman has a hand in setting the par value. His program for each month based upon the activity ratio set by the planning department is the working basis for the new budget. The results of each month are scrutinized by the works manager and auditor; pencils are sharpened

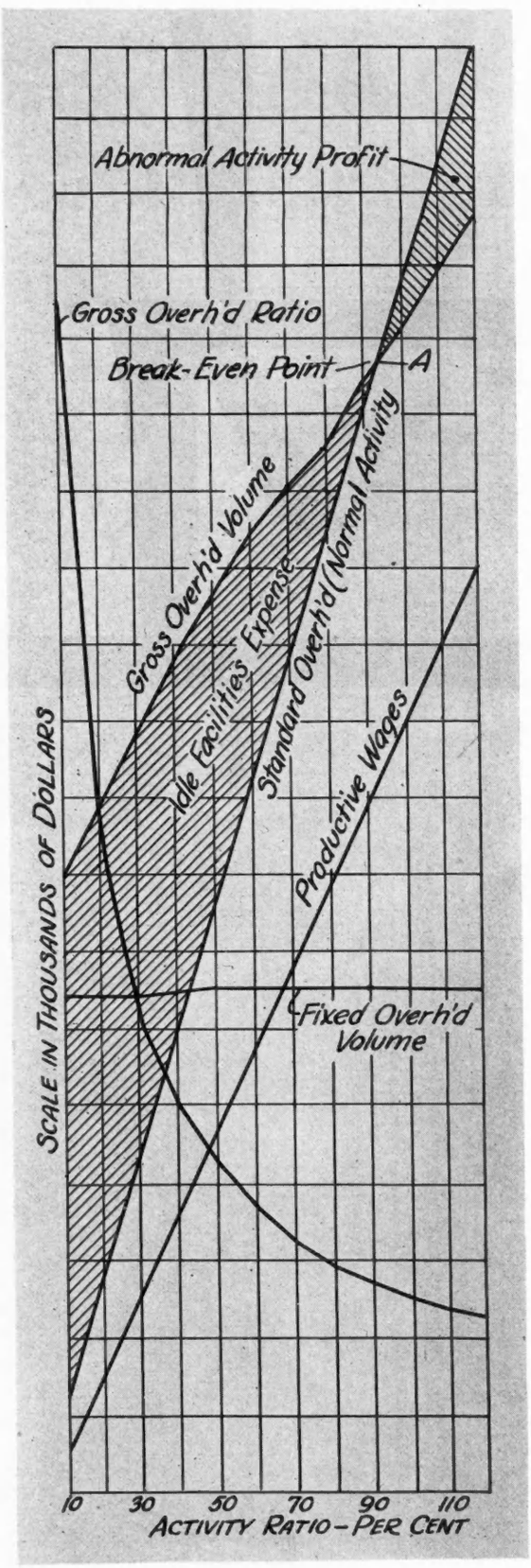


Fig. 3—Management gets a quick picture of operating history from this analysis. An unusual feature of the graph is the area marked "Idle Facilities Expense" which shows the penalty of small activity ratios

in an effort to lower par. The final figures must be reasonable and represent an acceptable compromise.

The second feature is probably of greatest value to any organization—real partnership between the comptroller and works manager. In this plant, fiscal policies, accounting methods and similar details are dovetailed at the source between the two executives.

In operation, the budget is prepared month-by-month in advance, so that there are really twelve budgets to a year. It is set up on the basis of previous experience plus the suggestions of all interested department heads. As will be shown later, all burden accounts are segregated and a series of par values established for each item, for productive load capacities referred to as operating hours ranging from 10 to 120 per cent of normal activity.

That's the budget. Now for the organization structure that gives the thing its very life. Every function such as production, inspection, maintenance, stores, factory accounting, etc., is departmentalized with the foremen as the manager of his domain.

Production functions are vested in the production and planning departments. The latter schedules the work and determines the percentage of activity for each department for the coming month, taking into account the present condition of stocks, work-in-process, etc. Generally, this division is concerned with advance planning of production, production materials and all necessary small tools and machine tooling. The advance planning of the necessary small and machine tools is an important role, as upon its accuracy depends the degree of success the production department will have in carrying out the predetermined plan set by the planning department.

The chief function of the production division is to execute the schedules. Time study operates directly under the production manager and serves a number of important offices. For example, one of its duties is to study methods and improvements in these. Other duties are: cost estimates, setting of lowest rates and standard lines, and special studies such as the determination of grinding wheel life, tool life, etc.

Then there is the SKF Research Laboratory—the central engineering research department which originates specifications for raw materials; standards for hardness; quality; and conducts tests of all kinds on materials and finished product.

Going into the shop, we find all stores under a central control so as to provide a positive check of the flow of small tools and expense supplies. Here it is under the watchful eye of the stores keeper whose main job is to keep supplies within a predetermined minimum —rationed out according to the necessities of every department.

Several tool cribs located at strategic points serve as depositories for the small tools charged to the departments they serve. The supply in these cribs is replenished from central stores as needed.

"How do you manage to keep your maintenance within bounds?" we inquired, having in mind the seriousness of the problem in many plants. It seems to be simple the way they do it. Maintenance expense is curbed in much the same fashion as any other account by shrinking or expanding the force according to activity ratio. If, for example, the activity ratio for the coming month is 50 per cent of normal, the department is tailor-fit to suit. Maybe this is a good idea for those who are looking around for a way of putting maintenance on a paying basis.

Activity ratio controls the inspection department in exactly the same way. By means of a resilient payroll,

the costs of both maintenance and inspection seem to be happily controlled.

With this background, let us look behind the scenes to see what makes this organization click. In Fig. 2 are shown three forms which mean about the same thing here as a compass does on a ship. Exhibit A, known as "Departmental Budget Expense Details—Various Activities" is used to project the budget allowance for each expense account, for each department, by activity ratios varying from 10 to 120 per cent; activity ratio representing the ratio of used machine hours to possible hours at normal capacity. For indirect departments the basis is average plant activity; for productive departments, the basis is its own activity ratio amended as necessary by taking into account work in process or excess banks.

In operation, a definite budget allowance is set for each account, for each activity ratio. When the foreman is told by the planning department what his activity ratio is expected to be for the coming month, he knows exactly how much money he can spend on each expense account.

Exhibit B—"Overhead Expense Budget," is designed to show the achievement in each department by comparing the actual with budget figures. Budget figures originate from Exhibit A. Exhibits A and B are discussed with the foremen by the department heads.

Management gets a moving picture of conditions from Exhibit C—"Works Operating Report." This is a complete summary for the plant, of the accumulated actual and budget allowances for each expense account secured by summarizing the data from Exhibit B.

So actually the motivating force behind the whole system is the history given by Exhibit C. Variations from budget estimates stand out in relief and can be quickly investigated. It also offers an excellent means for checking up on par; if certain accounts are consistently bettered, par is cut down some more. This advantage reflects itself on the next budget and constitutes the normal improvement due to the momentum of the system.

We mustn't forget to mention another part of the "works" that is very useful when it comes to finding leaks. We refer to the scrap report which is held in healthy respect by many works managers. The one used here is very ingenious. Scrap is charged by operations, on the sound basis that the amount of damage is measured—not by the cost of the offending operation, but by the total value put into the piece up to and including the rejected step. The control form carries in addition to the cost of the offending operation, the total cost of the rejected piece and the percentage of this to the total payroll of the department for the period.

Excess costs nominally due to rejections based upon long experience are charged into the standard cost for the part. Naturally, a certain amount of rejection is to be expected and is unavoidable in any kind of manufacture. However, the scrap report is watched carefully and anything that looks high is immediately investigated. Out of these studies come some of the most valuable features of the set-up. For instance, rejections may come as a result of dull tools, inaccuracy of the machine, change in materials, and a host of other reasons which can be quickly traced and corrected.

So far we have concerned ourselves with a close study of the mechanical elements of this unusual control system. How may we measure its effectiveness in the absence of a standardized formula? Perhaps the best way is to accept the statement of achievement so evident in Fig. 1. Any seasoned manager will agree that anyone who can make variable overhead costs toe the mark—and that's what they are doing—has something good. And if the reader still has any doubts, consider the fact that their overhead not only follows the changes in activity but that the actual is consistently better than the projected budget.

Now let's take a look at another clever device that holds so much promise for management. We mean Exhibit E—"Estimate Gross Operating Budget," Fig. 3, which is prepared at the beginning of each budget period. From this, management gets a vivid impression of the course of such things as estimated gross overhead volume, idle facilities expense, etc., developed at each degree of activity.

Maybe those harassed works managers with whom we talked recently can use some such device in their own operation. Certainly this is the most convincing way of showing that budget savings rise and fall with the degree of activity and cannot be made stable by hocus-pocus at will.

Observe that in Fig. 3, overhead has been segregated into fixed and variable, the variable being the controllable expense. The basic relation is that of a standard overhead based on normal activity. The next important factor is gross overhead volume. The two curves intersect at point A, which is about 95 per cent activity ratio; the included areas bring in several significant concepts.

First, the point of intersection A is the break-even point, so-called by C. E. Knoepel in his profit analysis. Now the area to the left, labeled "Idle Facilities Expense" represents the penalty of operating below normal activity. As you approach point A, this expense diminishes; as you pass it, the upper area marked "Abnormal Activity Profit" introduces you to something that may well be the goal of all management—an area of activity where a profit is made on the fixed overhead volume.

In the beginning, the management here is aiming at the reduction in the area below point A. This may be accomplished by depressing the curve of "Gross Overhead Volume" so that it dips closer to the curve of "Standard Overhead." If this can be achieved another great step forward will have been made in the field of management.

This control system shows a beautiful approach to a solution of the old bugaboo of overhead costs. It demonstrates the practicability of making variable costs follow the peaks and valleys of productive activity or inactivity with an uncanny degree of accuracy. Yet the mechanism is striking in its simplicity and does not create an additional burden of administrative expense which so many associate with the introduction of "system."

English-French Dictionary

English-French Comprehensive Technical Dictionary of the Automobile and Allied Industries, by Lewis L. Sell, Ph.D. Published by the International Dictionary Co., New York, 1932.

PERHAPS the best recommendation that can be given Dr. Sell's dictionary is that it has been in constant use in this office since its receipt for review purposes. The book contains more than 150,000 technical and general terms relating to the automobile, its use, and sale. In the English vocabulary, differences between American and British use are noted carefully, and followed by definitions in idiomatic French. Currency of the French definitions is assured by the fact that they have been checked against actual correspondence.

Continuous Gas Carburizer Used by

by E. A. Thomas
Metallurgist, Newcastle Division, Chrysler Corporation

WHEN the Chrysler Corp. decided to assume the manufacture of its own steering gears, it became immediately necessary to provide for the installation of the most suitable equipment for the heat treatment of the worms and worm wheels (sectors).

The management of the Newcastle plant was impressed by the possibilities of a new type of continuous gas carburizer, designed by the Surface Combustion Corp. and, with the approval of the metallurgical department, contracted for the purchase of a furnace capable of handling 120 worms and sectors per hour. Installation was concluded the second week in December, 1931, and three months of constant operation have vindicated the judgment of all concerned in its purchase.

The furnace proper, the essential features of which are shown in Fig. 1, is both over and underfired and contains an alloy muffle composed of flanged and bolted sections, which is anchored at the discharge end and floats toward the opposite end on alloy rollers supported in frequent alloy cross-supports. The carburizing trays are pushed through the muffle on two sets of rollers by a suitable device. The trays and carburizing gas travel in the same direction. At each end of the muffle is an air-actuated valve which acts as a seal. The valve at the charging end is air-cooled, while the discharge valve operates at approximately muffle temperature. The first two muffle sections, which comprise the deposition zone, are composed of a straight chromium iron, having no catalytic influence upon CH_4 decomposition. This eliminates carbon deposition on the walls of the muffle in this zone. All other sections are of a conventional Ni-Cr-Fe analysis. (In case at any time it should become necessary to replace a section, the muffle is disconnected at both valves and is raised and drawn out the charging end of the furnace on rails.)

At the discharge end is located a holding chamber capable of maintaining any desired temperature in the work immediately prior to quenching. A purging chamber carrying two trays is located in front of the charging end. Flue gas is used for purging this chamber of air to eliminate the introduction of O_2 into the muffle.

A water gage indicates the muffle pressure and although 3 in. is easily obtainable, the operating pressure is only ¾ in., which produces equally good results.

The panel board contains natural and flue gas differential draft gages on which constant pressures of both gases are maintained. It also contains a tube in which exhaust muffle gas burns at all times. A record of the temperature of this flame is obtained by means of a couple inserted in the tube and the repeating cycle shown on the charge is indicative of both the composition of the exhaust gases and the proper functioning of the furnace and its operator. Supplementary gas analyses are made, however, as a positive check on this chart. It is considered unsafe to operate with a CO percentage of less than 5 per cent in the exhaust gas because of improper carburizing results.

Regardless of production conditions, the furnace is never cooled below 1400 deg. Fahr. and when not in use requires practically no attention. However, after a

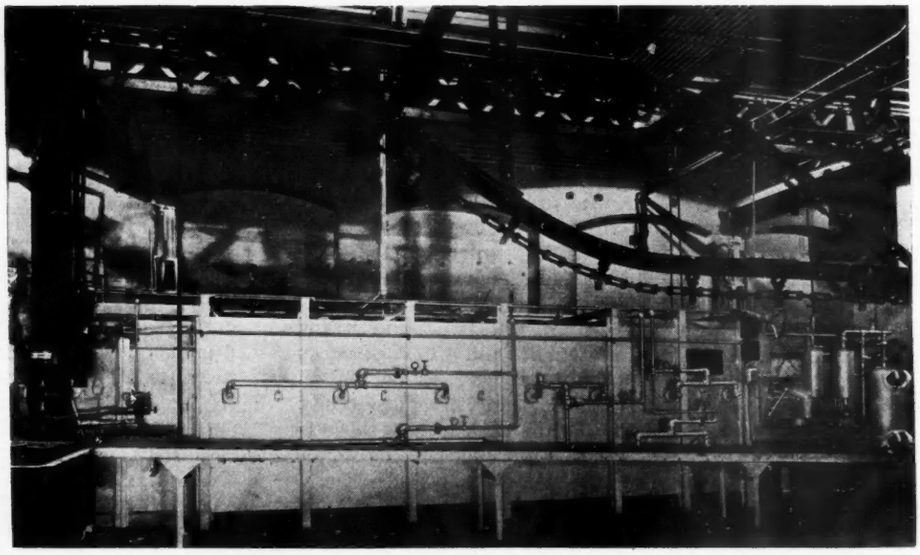


Fig. 1—Eutectrol, continuous gas-carburizing furnace, installed at the Newcastle plant of the Chrysler Corp.

Chrysler on Steering Worms

Furnace at Newcastle plant is both over and underfired and has alloy muffle made of bolted and flanged sections. Capacity is 120 worms and sectors per hour

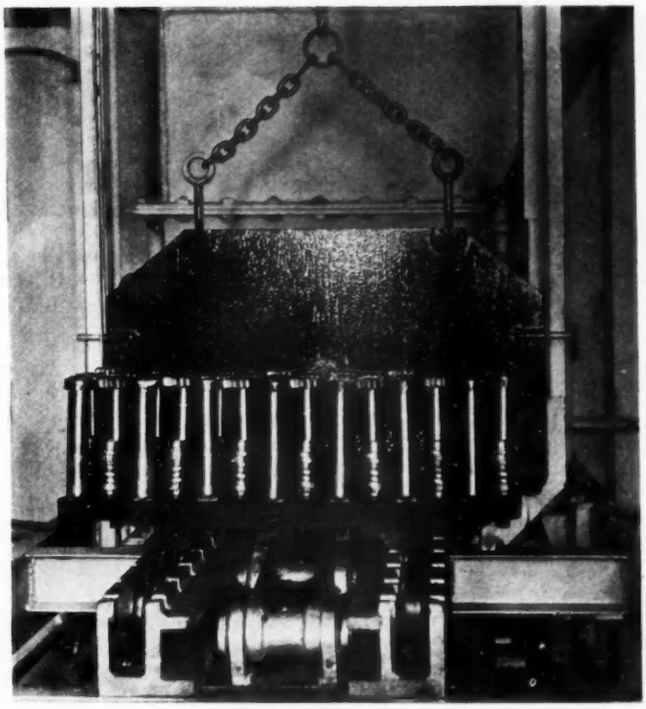


Fig. 2—Charging end of the furnace showing a tray loaded with steering gear worms and sectors

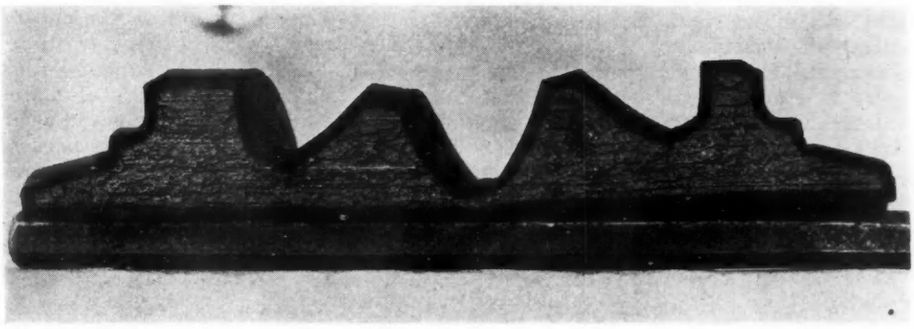


Fig. 3 — Fracture of worm (x2½) etched to show uniformity of case

period of inaction, and before any natural gas is introduced into the muffle, it is essential to remove all O_2. This is accomplished by purging with flue gas only for a period of about one-half hour. A gas analysis is then made to insure the absence of all O_2 and the furnace is ready for operation.

Trays, each containing 35 worms and 35 sectors as in Fig. 2, are then charged into the muffle at 18 min. intervals. Since the muffle accommodates 22 trays, a total time of 6.6 hr. is necesary to produce 0.035 in. case on the sector and 0.040 in. on the worm. The discrepancy in case depths is due to the difference in analysis of materials used for these parts. The X-1314 steel used in the worms carburizes correspondingly faster than the straight carbon type of which the sector is composed.

When the time clock rings an 18 min. interval, the following sequence of operations is performed:

1. The muffle discharge valve raises, a tray is drawn into the holding chamber and the valve closes.
2. The discharge door of the holding chamber is opened, the work is quenched in oil, the tray is returned by a roller conveyor and the door is closed.
3. The charge valve raises and the automatic pusher moves another tray into the preheat section of the muffle.
4. The charge valve closes and another tray is placed into the purging vestibule.

All of these operations are controlled by the operator

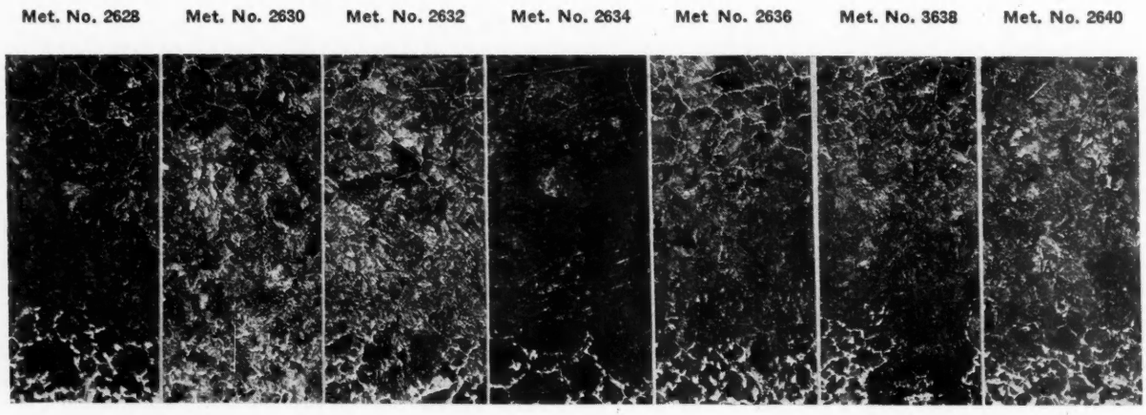


Fig. 4—Test for uniformity of carburization across tray. All samples from same bar S.A.E. X-1314 steel. C = 0.12 — 0.20; Mn = 1.00 — 1.30; P = 0.04 maximum; S = 0.075 — 0.150

at the discharge end of the furnace. Several minutes before the next push, another tray must be rolled into the purging chamber and the cycle is repeated.

All worms and sectors receive a Rockwell hardness inspection, a low limit of C-60 being specified, and occasional telltales are broken daily to check case depths. The hardness on both parts has been extremely uniform, averaging C-63-C-64 after water quenching from a tube furnace and drawing at 325 deg. Fahr. in a mesh belt conveyor furnace, heated exclusively by the waste gases from the hardening furnace. Rejections for hardness are very rare. No rejections have as yet been made for case depth or character.

The elimination of distortion is also very important on these parts and has been accomplished to an unexpected degree. A uniform shrinkage in the hole and overall length of the worm of about .003 in. has been found to occur and must consequently be considered in the machining of the part. No appreciable change is found in the sector. Fig. 3 shows an etched longitudinal section of a hardened worm and illustrates distortional possibilities.

A number of experimental runs have also been made on various other production parts which have long been the subjects for chronic complaints of distortion. This trouble has been easily traceable in each instance and has been found to result from any one or several of the following conditions:

1. Faulty packing of parts in carburizing box.
2. Impossibility of uniform heating of parts in a carburizing box.
3. Effect at high heats of weight of other parts and carburizing compound on pieces in the lower section of the box.
4. Shifting of parts as the boxes are pushed through the furnaces.
5. Dumping boxes while parts are still too hot.

All possibility of distortion emanating from the conditions enumerated above is eliminated by the use of this continuous process and every experiment has shown excellent results. For example, the average free-wheeling driveshaft has a run-out on the cup of approximately .004 in. after box-carburizing, with occasional instances of .010-.015 in. Experimental runs in the gas furnace indicate the possibility of maintaining a run-out limit of as low as .003 in., even after hardening. The case depth specified on this part is .060-.070 in. Similar results have been found on gears and pinions. The necessity for straightening on parts which permit this operation can also be materially reduced.

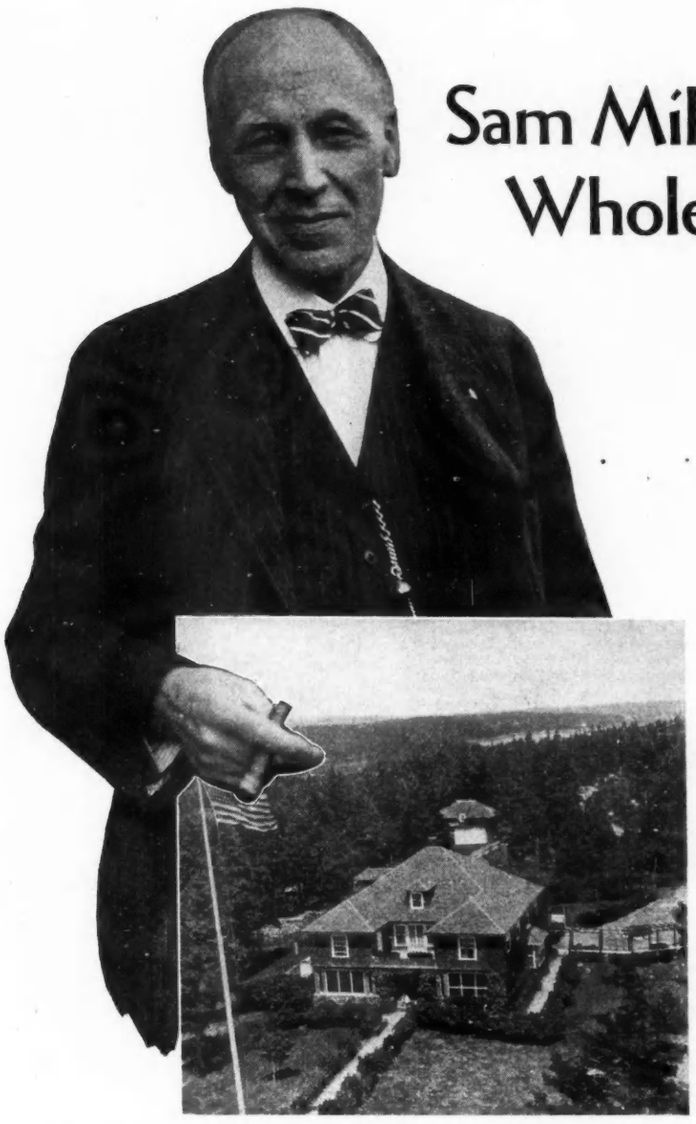
A New Protected Metal

ACCORDING to a recent research report by Dr. A. W. Coffman, a new protected metal called "Robertson-Bonded Metal" (R-B-M) has been carried through the laboratory stages of development at Mellon Institute of Industrial Research. Copies of this report, giving complete information concerning this new material, may be obtained by applying to Mellon Institute, Pittsburgh.

Robertson-Bonded Metal is a laminated metal-felt material in which felted materials are cemented to steel with heat and pressure, utilizing metals as adhesives. The composite laminated material, the outer surfaces of which are suitable felts, is then saturated with any desired saturant chosen with reference to the corrosive condition to which the metal is to be exposed in service. Paint, lacquer and resin films superimposed on the saturated felt give not only added protection but also desired attractiveness of appearance in the finished product. Owing to the fact that it is possible to choose between a number of felts and felt saturants to stand against various corrosive conditions, this new protected metal promises flexibility in providing corrosion resistance. The ductile nature of the metal bond between felt and steel makes it possible to subject this material to forming operations such as shearing, bending, corrugating, rolling and mild drawing without destroying adhesion between felt and steel. By selecting asbestos felt together with fireproof saturant a fireproof material results, while an increased insulating value over that of bare metal is obtained with any combination of felt and saturants. It is also claimed that this new material of construction has the strength of metal with none of the attendant "ring" and reverberation of bare metal.

Sam Miles Dies in England; Whole Industry Mourns

Veteran show manager, nearing 70 years, had resigned from post with N.A.C.C. only few weeks ago



Samuel Arthur Miles, 1862-1932
(Inset) Mr. Miles' residence on his estate at Christmas Cove, Maine, near which he maintained a camp at which hundreds of poor boys from city slums have found happiness and health

THE crowds have gone. The doors have closed. Samuel Arthur Miles has finished his last show.

Last Monday, April 25, the veteran manager of the National Automobile Shows in New York and Chicago died following a stroke of apoplexy at the home of his sister, Mrs. Margaret Pratt, in Bristol, England.

Only a few weeks before he had submitted his resignation as show manager of the N.A.C.C., a position held since the formation of the chamber in 1914. He would have been 70 years old on May 10 and felt that he had earned a rest from active work. The resignation was accepted by the chamber directorate with profound regret on April 6. It had been Mr. Miles' plan to continue his interest in the automobile shows in an advisory capacity, but to devote most of his time to a year-'round haven for the slum children of Maine and Massachusetts industrial cities which he was expecting to establish on his estate, "Clifton," at Christmas Cove, in the Maine Woods.

For 10 years he has been "Uncle Sam of Christmas Cove" to thousands of unfortunate children from settlement districts of nearby cities whose greatest happiness has been found as his guests at Miles Little Harbor, the summer camp on his Maine estate. This camp was supported solely by Mr. Miles and was one of many philanthropies in which he was interested.

But completion of this final dream was not to be. His death occurred while he was making his annual visit to his boyhood home in Bristol, where he was born in 1862. More fortunate than most men, though, was Sam Miles in the achievement of his ambitions. Aside from this last one, he realized all his dreams; his dream of becoming a publisher, his dream of popularizing automobile shows and making them beneficial and profitable, and his dream of benefaction. He realized them all—but not without hard work.

Sam Miles' life story falls into the adventure category; the ambitious runaway boy who made good—and did good for others.

While yet a boy, he fell victim to the seductive odor of printer's ink. He tasted it in large measures on the Bristol *Mercury*, where he worked as a printer's devil for the munificent stipend of 60 cents a week, but instead of satiating him, this apprenticeship experience merely whetted his appetite.

He was still in his teens when he became a correspondent for the London *Referee* and *Land & Water*, a pair of English sporting publications, and—momentously—felt the lure of the New World. This adventure into a strange land—viewed by adult eyes that foresaw a multitude of dangers and obstacles for one so young—met with parental opposition. But, undaunted and courageous almost to the point of reck-

Sam Miles' Last New York Show, 1932

"IT'S just 12 minutes to 2, Mr. Miles, it's raining and damp outside and there's a big crowd been milling around out in front for nearly an hour. What do you say we open the doors now instead of waiting until two o'clock?"

Charley Ellias, right-hand man of the veteran show manager, Sam Miles, speaks to his chief who sits on a lounge just inside the doors of the Grand Central Palace, resting a recently wrenched knee and answering final before-opening questions from friends and staff.

"Have they finished that work on the fourth floor yet?" Mr. Miles queries.

"Almost," came the reply. "They'll be finished before the crowd can get that far anyhow."

"All right. Open the doors!"

And so began this 32nd National Automobile Show in New York on Saturday afternoon, Jan. 9, 11 minutes ahead of schedule.

A moment later, eager crowds were swarming up the newly carpeted stairways, hesitating for a moment at the top, then gradually fanning out in all directions to pass first judgment on the 1932 products of the automobile industry.

And now, 11 minutes ahead of time, the doors were opened. The crowds came in. And Al Reeves and Sam Miles, standing together just off the center aisle, appraised the 1932 throng of potential buyers with eyes of long experience—and chatted amiably the while.

A Bit of Reminiscence

"THIS isn't the way I used to do shows," Sam Miles struck a reminiscent vein as he sat in a newly cushioned little lounge near the main entrance stairway to the Grand Central Palace waiting to give the word to open the doors for his 32nd New York show last week.

"Why, in the old days, instead of sitting here, I'd have been down there by the gate answering questions, seeing to this detail and that, and doing everything in the place except sell tickets—and I even sold them to the exhibitors. I used to be my own treasurer and almost my own everything else. We couldn't afford in those days to pay any staff to do things.

"And—well—if this business depression keeps on the way it is, I may be back selling tickets yet!"

Then, chuckling as he did so, he stood up to get a better look at one of the largest opening crowds in history as it rushed up the steps. —N.G.S.

How the personality of Sam Miles dominated the National Automobile Shows is illustrated by these two clippings from the Jan. 16 issue of AUTOMOTIVE INDUSTRIES

lessness, Miles, then 18, and a companion, shipped for America and in time landed at Castle Garden.

Sam's first opportunity to thwart starvation came in the shape of a position as assistant bookkeeper with the Corbin Banking Co. in New York City, and he grabbed it unhesitatingly. This concern was a private banking house. Sam's pay was $7.50 a week, not so very bad in the '80s, but by far not his idea of what he deserved for his hazardous leap across the Atlantic. In this new work he found it possible to do some writing, but the topics were so dry as to parch the zeal of a young journalist whose metier was athletics.

He was not long in New York's financial district before he lent an attentive ear to glamorous stories of success emanating from the progressive city of Chicago. Thither he journeyed with the same confidence that accompanied him across the water, but with a purse worthy to be called such.

Odd jobs followed until eventually he landed a place on the *Sporting and Theatrical Journal* as associate editor. Sam was in his element, and throve. In time he moved into the editor's chair, and later took to freelancing with the Chicago *Inter-Ocean, Times, Daily News* and *Herald,* and syndicated articles to Chicago, Minneapolis, Cincinnati and Pittsburgh newspapers. His succeeding step realized his journalistic ambition: he founded the *Referee,* a cycling paper, and became a publisher. He continued in this upper stratum of the Fourth Estate by becoming part-owner of *Cycle Age* and eventually owning and editing *Motor Age,* a pioneer motor magazine which later merged with *Automobile Trade Journal,* now the industry's leading dealer business paper.

While editing one of the cycle papers in 1888, Sam assumed the role of showman that later became his for life. He promoted a bicycle show and race meet in the old Exposition Building in that year and followed it with five other bike expositions.

When he became affiliated with the automotive industry as editor of *Motor Age,* he determined upon a personal venture in 1901—it was the staging of the first automobile show and the second to be held in America. The first had been held in New York in 1900, a few months earlier. Miles' venture was not a profitable one financially, but that it did not quench his ardent faith in the idea was proof of the deep root it had taken. He plugged away and managed to convince a goodly number of makers to take space in his second show. This, promoted in cooperation with the Chicago Automobile Club, proved a thorough success. It created an enthusiasm that has not waned since. The third and fourth exhibitions were put on before the makers decided to make the shows their own. This was accomplished, Miles retaining control of the shows, eventually including the New York exhibit with the Chicago event, under the auspices of the National Automobile Chamber of Commerce.

In 1903 Sam became general manager of the National Association of Automobile Manufacturers, having disposed of *Motor Age.* This position he held until 1912—staging shows the while—when the N.A.A.M. and Automobile Board of Trade amalgamated as the National Automobile Chamber of Commerce. Sam became the first general manager of the N.A.C.C., but after one year of office he relinquished the post to Alfred Reeves and devoted all his time to show management.

But Sam Miles did not restrict his efforts to showmanship. Another activity was the Harrolds Motor Car Co., metropolitan Pierce-Arrow distributor, and Arrow Motor Realty Co., which he organized with Harry Unwin, and which were conducted with such ability as to be worthy examples of successful merchandising.———N. G. S.—G. T. H.

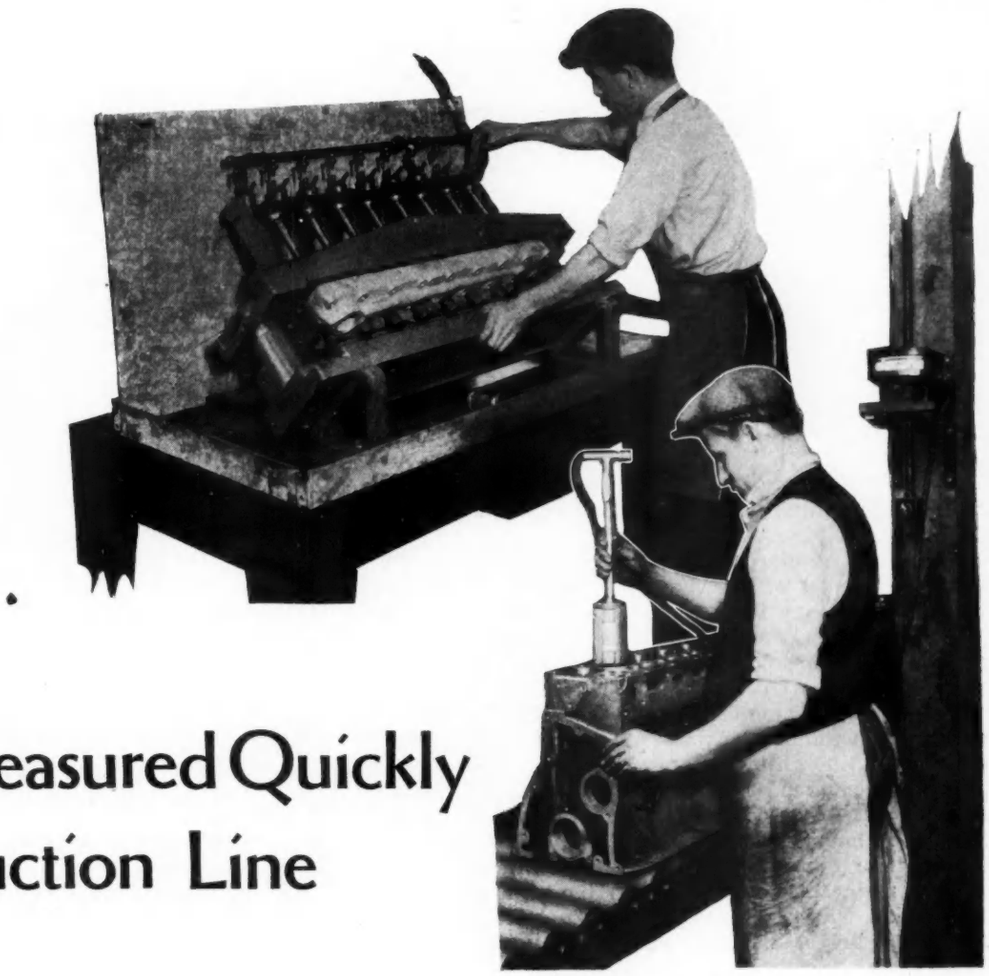


Fig. 1—Combustion chamber volume checked in 55 seconds on this quick-acting fixture used in Graham production

Fig. 2 (below)—Cylinder wall thickness measured within 1/64 in. by means of magnetic testing device shown here. The magnetic flux through exploring coils is a direct measure of wall thickness

Blocks Measured Quickly on Production Line

AMONG the major production problems which modern requirements impose on manufacturers of passenger-car engines are those of uniformity of cylinder-wall thickness and of compression-chamber volume. Graham-Paige Motors Corp. has developed and is using two rather unique devices to check blocks and cylinder heads 100 per cent with respect to these items.

The cylinder-head checking device is particularly interesting. Its importance is accentuated by the fact that Graham engines have a standard compression ratio of 6.7 to 1 although designed to use straight gasoline. Bohnalite aluminum-alloy cylinder heads are used. With this compression ratio it is imperative not only that the combustion chamber volume be kept within limits, but also that the variation between cylinders be kept under strict surveillance.

The device used and illustrated herewith (Fig. 1) checks all eight combustion chambers simultaneously. A finished cylinder head is clamped upside down in the fixture between the bed plate and the movable upper plate. Spring-mounted plugs in the lower plate stop up the spark plug openings while a rubber gasket makes a water-tight seal between the head and the plate when the latter is drawn down and held under spring pressure.

In the upper part of the fixture are eight glass tubes, surrounded by windowed brass jackets, leading through the fixture to the combustion chamber spaces. Mounted back of these tubes, on a rod pivoted at both ends, are eight metering cups of brass, resembling small watering cans. These are filled to overflowing with water from eight jets controlled by a single valve.

When the cylinder head is clamped in position the operator moves a crank that rocks the metered cups on their shaft, emptying their contents into the funneled tops of the brass tubes. The quantity of water is sufficient to fill the combustion chamber spaces and to rise in the tubes to form indicator columns that may be observed in the glass tubes. The latter are provided with adjustable sight limits, indicating maximum, minimum and the midpoint.

A master cylinder head, with all combustion chambers exactly of the minimum volume, is used to establish the position of these steel clips. When a production head is then tested, a glance across the eight tubes shows whether any one combustion chamber is of too great or too little capacity. If all show too much space, correction is made by machining the whole face of the head. Undersize chambers or variation in the chambers (indicating casting errors) require rejection of the head.

Up to recently, combustion chamber size control was carried on with maximum allowable variation of 5cc., equivalent to .3 of a ratio. The set-up is now being operated on the basis of a maximum allowable variation of 3cc. or 0.2 of a ratio. While this device

(Turn to page 674, please)

Electrochemists Discuss Light Metals

Baltimore Meeting of Society has program with papers by Russ, Moore, Re, Baker, Merkus, and Stock. Much of automotive interest developed in year

QUITE a number of the papers presented at the sixty-first general meeting of the Electrochemical Society in Baltimore, April 21-23, were of automotive interest. These included papers on New Electric Furnaces, by E. Fr. Russ; The Electric Furnace in the Cast-Iron Industry, by W. E. Moore; Plant Practice for Nickel-Plating Aluminum, by Andrew V. Re; Lead and Lead-Antimony Anodes for Chromium-Plating, by E. M. Baker and P. J. Merkus, and Beryllium, by Alfred Stock.

Mr. Russ in his paper described new, large-sized electric furnaces of the induction type recently produced in Germany for melting non-ferrous metals or for the continuous annealing of metal strips. One recent installation described comprises two electric annealing furnaces with water bath, electrically-heated pickling baths (10 per cent sulphuric acid), followed by mechanical washing machines, an electric drying oven, and, finally, the coiling devices or drums.

It has been found recently that for annealing brass or copper strips in coils, an electric pot furnace with inside and outside heating is preferable, as the time required for annealing is reduced and the annealing zone is maintained at a uniform temperature. It is stated that in these pot furnaces the metal remains absolutely bright without receiving any treatment either before or after the annealing.

Possibilities of Beryllium as Alloy

Prof. Alfred Stock of the Karlsruhe Technical College gave a brief outline of the history of beryllium, which was first prepared practically a hundred years ago, at about the same time as the other two light metals, aluminum and magnesium, but did not come into practical use until quite recently. The various methods of preparing beryllium from its ores were discussed, and Professor Stock then outlined its properties and possible applications. The specific gravity of the metal is 1.83 and its melting point, 2330 deg. Fahr. Beryllium is very brittle and is so hard that it scratches glass. At a dark red heat it can be pressed into plates. While it was formerly believed that beryllium had a very high electrical conductivity, it is now known that its conductivity is only one-twelfth that of copper. In accordance with its low atomic weight, beryllium is distinguished from most other metals by being highly transparent to X rays. At atmospheric temperatures beryllium, like aluminum, becomes covered with an imperceptibly thin film of oxide which protects it completely from further oxidation, and if comparatively pure it will retain its steely luster after years of exposure in the air.

On account of the high cost of the pure metal and of its brittleness, which latter makes it difficult to work, beryllium is not likely to become a metal for general use. The distinctive properties of the metal make it most valuable for certain special applications, however. For instance, owing to its high transparency for X rays, beryllium is now used for the windows of X-ray tubes. The high reflectivity of the metal for ultra-violet light, and its very low tendency to sputter in cathode ray tubes, are likewise valuable characteristics. The beryllium arc has been used for photochemical purposes.

Metallic beryllium may be electroplated upon copper, nickel, iron, aluminum and alloys of the light metals by using a melt of an alkali fluoride and beryllium oxyfluoride. By keeping the bath at the proper temperature, and subsequently heat-treating the deposited metal, it is possible to obtain a superficial alloy of beryllium with the underlying metal, resulting in firmly adherent coatings having the properties of the respective beryllium alloys.

Beryllium as a deoxidizing agent in the casting of copper has proved to be of commercial value. A few hundredths of 1 per cent of phosphorus, heretofore most commonly employed as the deoxidizer, causes a marked decrease in the electrical conductivity of the copper. On the other hand, 0.01 to 0.02 per cent of beryllium, which combines with nearly twice its weight of oxygen, is an excellent deoxidizer for high conductivity copper castings.

The light alloys of beryllium with aluminum have not come up to expectation. These alloys have been investigated, especially in America.

There is no difficulty in preparing Be-Al alloy castings of any composition. It is also possible to secure flawless rolled sheets from cast alloys containing beryllium up to 75 per cent. The rolling is either done cold, with occasional annealing at 1100 deg. Fahr., or hot at 1100-1200 deg. Fahr.

Efforts to alloy beryllium with magnesium have been unsuccessful, because at temperatures below its own melting point beryllium does not dissolve in liquid magnesium, and it is impossible to heat the two metals up to the melting point of beryllium, because the magnesium boils before that temperature is reached.

Plating, and Electromelted Iron

Surprising results as to temper and hardness are obtained when heavy metals such as copper are alloyed with a small per cent of beryllium. Siemens & Halske have explored this field with great thoroughness and have developed many valuable commercial applications.

The beryllium-bronzes are about as resistant to corrosion as the tin or the aluminum bronzes. They likewise cast easily and are readily cold worked. They can also be hardened by a suitable heat treatment. When 2 to 3 per cent Be is added to copper, the hardness is increased to five times the original (from 100 up to 400 or 500 Brinell); the limit of ductility is increased seven-fold, the breaking and the bending limits, threefold. A copper alloy with 6 to 7 per cent Be has a Brinell hardness of 750, corresponding to that of the hardest steel. A bright commercial future is predicted for these Be bronzes by Professor Stock. They are already used for springs, possessing a peculiar mechanical and chemical resistance, and showing very slight fatigue phenomena. Leaf springs have endured 10,000,000 bends without breaking. One such spring was even stressed 16,000,000 times and remained undamaged. In the case of electric locomotives, vibration causes brush-holders and contact-caps to last but a few weeks, when made of a beryllium-free bronze. The use of beryllium-bronzes eliminates this uncertainty. These Be-bronzes will also find application in the construction of aircraft and ships, as, for example, in the suspension-springs of airplane landing gear where special strength is needed to withstand the heavy shocks that often occur during landing. The bronzes are specially suited for those parts of electric motors and internal combustion engines that have to withstand heavy impact.

In concluding his paper Professor Stock said the plant of Siemens & Halske can produce a few tons of beryllium annually. According to its degree of purity, beryllium costs from $8 to $30 per lb. The price of the beryllium alloys corresponds generally to their beryllium content. As the consumption of beryllium becomes more extensive and its production increases, we may expect a considerable reduction in its price. Certain alloys such as the beryllium-bronzes may be produced relatively cheaply by direct methods, without the necessity of first preparing pure beryllium.

Finer Grain Sizes in Electromelted Iron

Mr. Moore in his paper stated that the use of the electric furnace in the cast-iron industry dates back only to 1917. During the war period it was used for making synthetic pig iron by melting down steel scrap and turnings and then recarburizing, as desired, to give a high-grade, low-phosphorus pig iron. Later it came into regular use for melting gray iron and was found quite valuable for producing strong castings.

The grain size in the usual test bar of electric furnace iron is notably finer than that of cupola cast iron, according to Mr. Moore. The finer grain structure of Lectromelt iron is also promoted by the more thorough gasification obtained in the electric furnace.

Mr. Moore gave some figures regarding the heat efficiency of electric furnaces and in concluding his paper stated that many purchasers now specify electric furnace iron as well as steel. Electric furnaces are finding wide use in the automotive iron foundry field, where they were first used in an outstanding way for making piston-ring iron, and now used for cylinder-block iron; automotive malleable irons; continuous-mold carburetor castings; and for cast-iron brake drums which are said never to score and to multiply the life of brake linings by from 4 to 6 as compared to pressed steel brake drums. Among other electric furnace iron products there is stove plate.

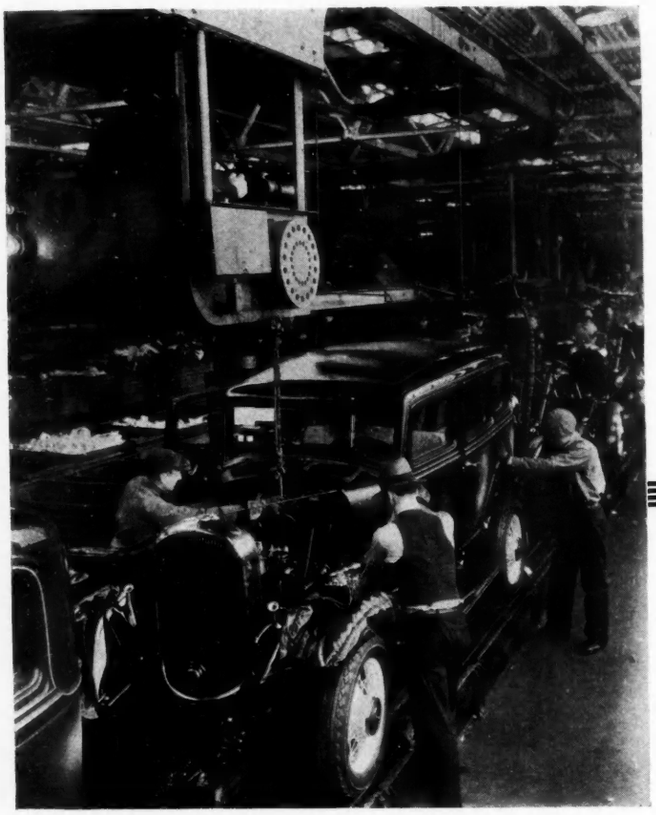
Solution for Nickel Plating Aluminum

Aluminum articles received from the foundry or fabricating department usually show pits, scratches or tool marks, according to Andrew V. Re. These imperfections are mechanically removed with an abrasive wheel using a very fine grain, followed by a coarse "sewed" buff and by a soft rubber buff. This prepares the articles for the cleaning solution, but before being dipped in the latter they are carefully wired or racked, thereby eliminating the need for direct handling thereafter.

For a cleaning bath Mr. Re uses a solution of the following composition: Water, 1 gal.; $Na_2B_4O_7.10\ H_2O$, 2 oz.; $Na_2CO_3.10\ H_2O$, 1 oz.; NaOH, ¼ oz.; NH_4Cl, ¼ oz.; black whale oil soap, ½ oz. The solution is maintained at a temperature of 200 deg. Fahr.

The articles are kept in this cleaning solution for a minute or two only; if they are kept in too long a mat surface develops. This is followed by a wash in clean cold water, which in turn is followed by a dip in strong, cold "acid" of the following composition: H_2SO_4, 1 gal.; conc. HNO_3, 1 gal.; $FeCl_3$, 2 oz.; water, 8 oz. This solution is maintained at 70 deg. Fahr. For best results the acid dip should not exceed 20 seconds. The solution is most conveniently prepared as follows: Bring the small quantity of water up to the boiling

(Turn to page 665, please)



PRODUCTION LINES

Production Lines of the Industry No. 13

1932 Plymouth line going full blast. It's half a mile long; the plant boasts of three others like it. You'll notice that instead of the customary body drop they use an overhead traveling crane

Real Pressures

Prof. P. W. Bridgman of Harvard is the high pressure expert par excellence. "According to the *Industrial Bulletin*, Number 64, here is how extreme pressures are being developed in the laboratory:

"The method of producing pressures is simple. Take a large, thick block of steel, bore a hole in it and put liquid into the hole. Then put into the top of the hole a plug which will not leak, and push on the plug. A limit of the high pressure obtainable is set by two things: the leaking of the plug and the yielding of the steel container."

Pressures up to 200,000 lb. per square inch may be employed daily without the (specially designed) apparatus showing any deterioration. Pressures up to 300,000 lb. per square inch can be measured with some precision, and, in a few cases, pressures up to 600,000 lb. have been reached.

Going High Hat

The latest is wrought iron alloyed with nickel, or copper; nickel and molybdenum, or copper and molybdenum. Nothing is changed in the fibrous structure which characterizes wrought iron, but strength is said to be increased by 25 per cent. Incidentally, the addition of nickel or nickel and molybdenum increases resistance to fatigue. Heat treatment is said to increase strength from 40 to 50 per cent. A development of the Highland Iron & Steel Co.

Oils for Quenching

Lubrication (The Texas Co.) for April, 1932, has an interesting discussion of oils for quenching heat-treated parts. Among other things it takes up quenching power, requirements of a quenching oil, purification, and the effect on color of steel.

The Big Show

Due to the change in plans for the Machine Tool Exposition as noted in our news columns last week, the Machine Tool Show again will come to our readers through the medium of the Annual Production Issue of *Automotive Industries*. Nuff sed.

Setting the Stage

A. J. Graf, writing in the current issue of the *Executive Service Bulletin*, restates an important function of factory management. It concerns what to do before determining rates of wage payment, standards of labor, and wage incentives. To get results don't start any of these things before building a sound foundation. The foundation—prepare tools and equipment; provide adequate facilities for handling and storing materials; develop good methods and standards for low cost production. Don't fire before you see the whites of their eyes, in other words.

Chiefly on Noise

A project to standardize noise measurement under the sponsorship of the Acoustical Society of America has been approved by the Standards Council of the ASA. The scope of the project is the "preparation of general standards of nomenclature, units, scales, and measurement in the field of acoustics with special reference to noise."—J.G.

MANUFACTURING MANAGEMENT METALLURGY

Willys Drops Warsaw Post; Returns in June to Battlefront in Toledo

Work-hard, play-hard, John N. Willys is shown as he took time for recreation from his duties as ambassador to Poland

TOLEDO, April 26—John N. Willys has tendered his resignation as ambassador to Poland and will return to active participation in Willys-Overland as chairman of its directorate. Announcement of his decision was made at the conclusion of the annual stockholders' meeting in which directors and officers were reelected.

Toledoans hailed the news with universal expression of belief that it will put a lot of confidence in the city and Willys-Overland organization.

Mr. Willys called on President Hoover today and tendered his resignation to Acting Secretary Wilbur J. Carr of the State Department. He will return to Warsaw in a few days and there will take the formal steps necessary to be relieved from diplomatic duties so that he may return to business here in June.

President Miller said operating expense of Willys-Overland in 1929 was $50,000,000 but in the last year it had been cut to $20,000,000.

In March, 1920, the Willys-Overland Co. had notes payable to banks amounting to $34,000,000 presumably growing out of its war contracts, strike and general expansion costs. It had accounts payable of $13,600,000. Inventory stood at $46,100,000, of which the greater part was in obsolete or surplus materials. By July, 1920, the company had purchase commitments of $63,000,000.

Those were the days of the grand scale operations when John N. Willys, president, had moved his headquarters to New York, and was bringing together numerous enterprises, such as the Electric Auto-Lite Corp., New Process Gear Corp., and large holdings of stock of Willys-Overland Co., Fisk Rubber Co., and others into the Willys Corp., which was to be a rival of the General Motors Corp.

The Willys Corp. built a plant costing nearly $12,000,000 at Elizabeth, N. J., which was to manufacture and sell the Chrysler Six, a light six-cylinder motor car, to bear the name of Walter P. Chrysler, who resigned as president of Buick and first vice-president of General Motors Corp., to join Willys on Nov. 1, 1919, as vice-president in charge of the production in Toledo in an effort to bring the company into the forefront of automobile manufacturers.

The Chrysler Six was developed by Willys-Overland but never came into production because the Willys Corp. was thrown into receivership on petition of the Ohio Savings Bank & Trust Co. of Toledo, the bank formerly headed by George M. Jones, and which closed in August, 1931. The Elizabeth, N. J., plant was never operated but later was sold to Durant interests in liquidation of the Willys Corp.

(Turn to page 670, please)

by Andrew Hornung
Budapest, Hungary

DIESELS With Precombustion

THERE are two main types of solid injection oil engines, one having a precombustion chamber and the other direct injection. These types have different combustion characteristics, and it is the purpose of this article to discuss these differences.

A precombustion chamber is a separated part of the combustion space connected with its main part through a narrow channel. While the piston performs the compression stroke, air flows through the connecting channel into the precombustion chamber. The progress of this flow affects the working conditions of the engine, and it is therefore important to calculate the velocity of flow. The phenomenon is very complicated, and to make calculations possible it is necessary to make certain approximations. Suppose that the pressure in the precombustion chamber is always equal to that in the cylinder, which assumption is permissible (since the differences are exceedingly small) provided the connecting passage is not too small in cross-sectional area in proportion to the piston-head area. It is also assumed that the heating effect of the walls does not cause any local increase in pressure. In that case the velocity of flow is directly proportional to the instantaneous piston speed, to the ratio of piston-head area to connecting-channel cross-sectional area, and to the volume of the precombustion chamber; it is inversely proportional to the sum of the instantaneous volume of the combustion chamber and the volume of the precombustion chamber, that is, to $V = V_c + V_p$.

Referring to Fig. 1, let

V_c = instantaneous volume of cylinder, and
V_p = volume of precombustion chamber, also let
w = velocity of flow,
c = instantaneous piston speed,
F = piston area,
f = connecting channel area, then

$$w = c \frac{F}{f} \frac{V_p}{V}$$

To give an illustration of the flow velocities, the results of the above calculation for an actual engine are shown in Fig. 2, where corresponding values of c, V and w are plotted against the crank angle. The principal dimensions of the engine are as follows: Bore, 4 21/64 in.; stroke, 5 29/32 in.; ratio of connecting rod length to stroke, 2; ratio of cross-sectional area of connecting channel to piston-head area, one-sixtieth; ratio of precombustion-chamber volume to total compression volume, 25 per cent; compression ratio, 14 to 1; speed, 1000 r.p.m.

It is obvious from Fig. 2 that the flow velocity attains its maximum value 30 deg. ahead of top dead center, and that beyond this point it decreases rapidly.

The highest flow velocity is reached during the injection period, and this assures good mixing of the fuel with the air in the precombustion chamber. Part of the fuel burns in the precombustion chamber, producing a sudden rise in pressure, which blows the unburned fuel at high velocity through the connecting channel into the main combustion chamber, the same as the air blast does in a Diesel engine with air injection. It is important to observe that in consequence of this action, fuel injection into the main combustion chamber is almost independent of engine speed; in other words, atomization and penetration of the fuel into the main combustion chamber and its mixing with the air are practically the same at all speeds. This system, therefore, is preferable for engines which must operate over a wide speed range, such as automobile engines. Combustion in the precombustion chamber being in the nature of an explosion, it always occupies about the same length of time, and it is scarcely affected by the higher flow velocity at higher engine speeds. In this way the coordination between atomization, injection and mixing is undisturbed, which assures smokeless combustion and good working condition of the engine at all speeds. This so-called precombustion effect is not affected by variation in, or even complete absence of, atomization, and the engine runs on without any noticeable disturbance, even if atomization is interfered with by dirt or air bubbles in the fuel line.

In the precombustion-chamber system the injection pressure must be kept at a moderate value, between 700 and 2100 lb. p. sq. in. The orifice of the spray nozzle therefore must not be unduly small. If the engine speed is doubled the injection pressure will be quadrupled, and, therefore, will be between 2800 and

In its second wide survey of problems connected with the design and use of automotive Diesel engines (of which this article is a part) Automotive Industries has already presented two articles by Joseph Geschelin, covering the economics of current developments in the art. These articles appeared in the issues of April 16 and April 23. The present article, by Mr. Hornung, who is chief engineer of Ganz & Co., Budapest, and a member of the S.A.E., covers specific problems of Diesel type-applications. Other articles of the same nature will appear in succeeding issues of Automotive Industries.

Chamber Meet Broad Operating Problems

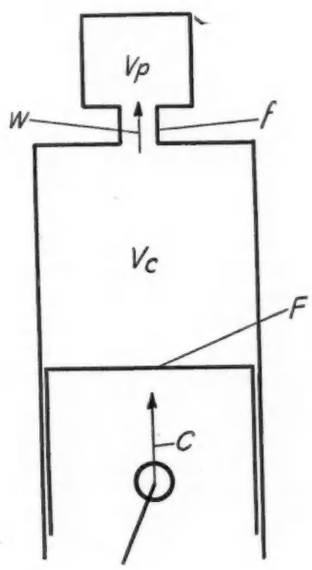


Fig. 1—Diagram of cylinder with precombustion chamber

8400 lb. p. sq. in. Even such a pressure is not excessive in compressorless high-speed Diesel injection practice. The atomization of the fuel jet in this system is of secondary importance, as any possible change in injection pressure has little influence on the working conditions of the engine.

However, there are some drawbacks in the precombustion-chamber system which must be mentioned here. The engine cannot be started from cold without the aid of an electric glow plug or of punk paper, as the heat of compression is easily dissipated through the relatively large surfaces, and as a result of the high velocity through the connecting channel. Further, the mean effective pressure generally is lower than with the direct injection system.

An ingenious device intended to overcome the first drawback of the precombustion-chamber engine is embodied in the Ganz-Jendrassik engine.* In this engine cold starting is effected by purely mechanical means, thus eliminating the cost and inconvenience of electric starting devices. The punk-paper system is not adapted for use with engines of four or six cylinders, nor for installations where the engine is not accessible from the operation while running, as in motor vehicles, for instance.

The lower mean effective pressure is due to the existence of dead spaces in the main combustion chamber at the sides of the jet or jets issuing from the connecting channel or channels. Besides this, the jets contain not only atomized fuel but also burned gases, which latter also mix with the air in the main combustion chamber.

The temperature of the jets is so high that parts of the connecting channel and of the piston with which they come in contact may be "burned" if they are not sufficiently cooled or not made of material that is unusually heat-resistant.

In the direct injection system the fuel is atomized by being forced under high pressure (4200-8500 lb. p. sq. in.) through the spray nozzle directly into the combustion chamber. In order to produce intense mixing, most of these engines have devices designed to create

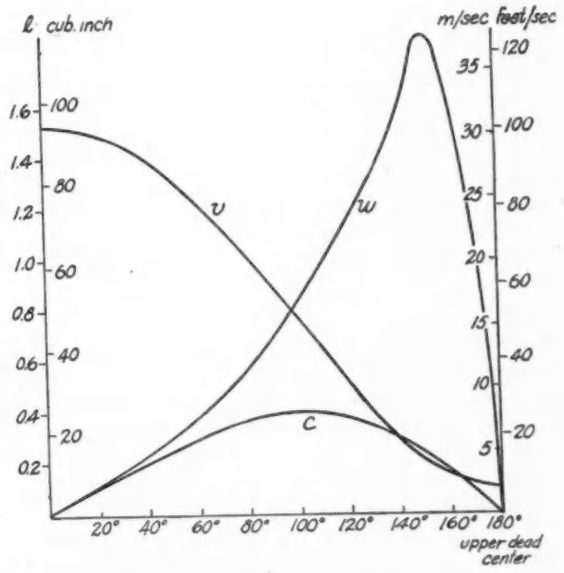


Fig. 2—Instantaneous piston speed (c), combustion-chamber volume (v) and velocity of flow (w) through connecting channel in precombustion engine

*See Zeitschrift des Vereines Deutscher Ingenieure, No. 29, 1929.

turbulence in the combustion space. For the most part, these engines can be started from dead cold without auxiliary devices, provided the fuel is adequately atomized at the low cranking speed. As a rule, there is a certain speed at which the thermal efficiency, the torque, and the mean effective pressure all have the maximum values attainable with smokeless exhaust (indicating efficient combustion). The mean effective pressure is mostly higher than with the precombustion-chamber system. At the speed mentioned above, at which the engine is intended to operate to best advantage, atomization, penetration and turbulence are in best accord, and mixing of the atomized fuel and air in the combustion space is most nearly perfect. The quality of atomization and penetration is very important here. The slightest disturbance in the injection line caused by dirt, gas bubbles or pressure surges, impairs the working conditions of the engine noticeably. Careful filtering of the fuel therefore is very important, as the finest particles of dust may choke the extremely small orifices of the spray nozzles, while with a closed-type nozzle they may cause leakage.

At higher engine speeds this harmony is disturbed, because, whereas the turbulence increases linearly with the speed, the relation between the injection pressure and the speed is quadratic. The higher injection pressure produces smaller fuel droplets, which sometimes lack sufficient penetrating power. Pressure surges may occur in the fuel line and affect the atomization. All such disturbances adversely affect the combustion, and for a while the engine will not run smoothly. Of course, such irregularities occur only at relatively high and quite low speeds, the engine thus exhibiting a certain similarity to the carburetor type of gasoline engine. Closed nozzles have the advantage of reducing pressure variations, but they are more sensitive than the open type to pressure surges in the fuel line.

A consideration of the individual characteristics of the two types of solid-injection oil engines discussed in the foregoing leads to the following conclusions:

Where a highly reliable engine is required which must operate through a wide speed range and which must be insensitive to abuses in operation (such as are likely to occur in passenger motor vehicles, in smaller stationary engines, etc.), precombustion-chamber engines should be adopted. On the other hand, direct-injection engines may be recommended in cases where expert operation may be expected and where the engine operates at a fairly constant speed, as well as where a high mean effective pressure, a high efficiency and low weight are essential, as in airplane engines, large stationary engines, etc.

Both of these systems are under intense development today, and busy engine builders are daily adding to the good qualities of the high-speed Diesel engine.

APPENDIX

The derivation of the relation between the velocity of flow through the connecting channel of the precombustion chamber is given in the following, in which the symbols used have the meanings which are apparent from Fig. 1:

V_p = constant,

$V = V_p + V_c$,

G_p = weight of gas in precombustion-chamber,

G_c = weight of gas in cylinder,

y = specific gravity of gas,

$G_p + G_c = G = yV$ = constant,

w = velocity of gas flow through the connecting channel,

$$\frac{dV}{et} = \frac{dV_c}{dt}$$

$$cF = -\frac{dV_c}{dt}$$

$$yfw = \frac{dG_p}{dt}$$

$$w = \frac{l}{yf}\frac{dG_p}{dt}$$

$$G_p = yV_p$$

$$\frac{dG_p}{dt} = V_p\frac{dy}{dt}$$

$$w = \frac{V_p}{yf}\frac{dy}{dt}$$

$$y = \frac{G}{V}$$

$$dy = -G\frac{dV}{V^2}$$

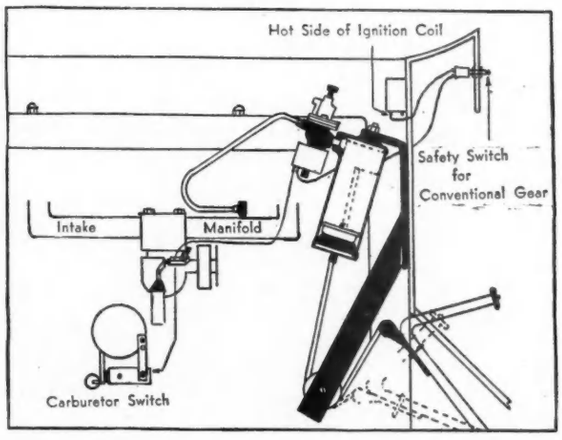
Substituting:

$$w = \frac{FV_{pc}}{fV}$$

The velocity of the flow which produces turbulence in the cylinder heads of gasoline engines, such as Ricardo heads, for instance, may be calculated in the same way.

Safety Free Wheeling

AN electrically-controlled free-wheeling unit of the clutch-control type has been placed on the market by the Safety Free Wheeling Co. of Chicago. It comprises a vacuum cylinder, a magnetically-controlled valve, a carburetor switch, steel-wire cable, a master switch and a few wires. To make the free-wheeling



effective the master switch is closed, and a slight pressure on the accelerator pedal then causes the clutch to engage. Thereafter the driver is said to have complete control of the car. If it is desired to operate the car in the conventional manner it is only necessary to open the master switch.

Electrochemists Discuss Light Metals, Plating and Electromelted Iron

(Continued from page 659)

point and then dissolve it in the ferric chloride. Allow to cool and add the two acids.

After this strong acid dip the articles are again washed in clean, cold water and are then either nickel-plated directly or else given a flash in the following brass-plating bath: Water, 1 gal.; NaCN, 3 oz.; CuCN, 2 oz.; $ZnCN_2$, ½ oz.; KOH, 2 oz. This is used at 70 deg. Fahr.

In preparing the brass bath, about half of the water is heated to 120 deg. Fahr. and the three cyanides are introduced into it. The caustic potash is dissolved in the remainder of the water, the solution is allowed to cool, and the two solutions are combined and diluted to the mark. Cast brass or brass sheet containing 70 Cu. and 30 Zn is used for anodes. If the brass solution has been properly prepared and the articles have been carefully cleaned, a very adherent brass deposit is obtained in about 1 minute. The brass film adheres so firmly that it can be removed only by abrasion or with acids.

After leaving the brass bath the articles are again washed in clean, cold water and then introduced into the following plating bath: Water, 1 gal.; $NiSO_4.6H_2O$, 18 oz.; $NiSO_4(NH_4)_2SO_4.6H_2O$, 3 oz.; NaCl, 2 oz.; $MgSO_4.7H_2O$, 1 oz.; H_3BO_3, 2 oz. The bath is kept at a temperature of 70 deg. Fahr.

In preparing the above bath the salts are dissolved in the order given, using about half of the total water heated to 120 deg. Fahr. The balance of the cold water is then added.

The nickel-plating procedure is very much the same as for plating solid brass. A current density of 15 amp./sq. ft. has been found very satisfactory. The voltage ranges between 4 and 5 volts; the anodes are cast of 95-97 per cent nickel. The duration of plating in the nickel bath depends upon the thickness desired: 15 minutes for thin plates and 1 hour for heavy plates. Small aluminum parts can be barrel-plated. In that case the voltage ranges between 10 and 12 volts, and the nickel content of the bath should be increased by 50 per cent for best results.

After nickel plating, the articles are given a final wash in cold and hot water, followed preferably by drying in maplewood sawdust. In some cases the nickel plate is polished with a good buff to increase the luster.

Corrosion of Lead Anodes in Chromic Acid

Messrs. Baker and Merkus, who are connected with the Department of Chemical Engineering of the University of Michigan, stated that in chromium plating steel, lead and lead-antimony, anodes are commonly used. The behavior of steel anodes has been previously described by Baker and Pettibone (in a paper read before the Electrochemical Society in 1928). The authors, continuing the work of Williams and Crimmins, has investigated the behavior of lead and antimonial lead anodes in a chromic-acid plating bath.

The rates at which the anodes corroded were expressed as loss in weight in grams per ampere-hour. This loss, of course, refers to a particular current density, but is independent of the size of the anodes.

Antimony in the anodes increases the rate of corrosion in continuous plating, while it decreases the solution rate in plating when an intermittent cycle is used. In the chromium-plating industry an alloy of 6 per cent antimony and 94 per cent lead is generally favored. If the two average curves of continuous plating and intermittent plating (2 to 1) are plotted on the same graph, they intersect at about 5.2 per cent antimony.

The antimony content in lead anodes from 0 to 12 per cent does not seem to have any effect on the ratio of hexavalent to trivalent chromium in the plating solution.

Effect of Humidity on Engine Power

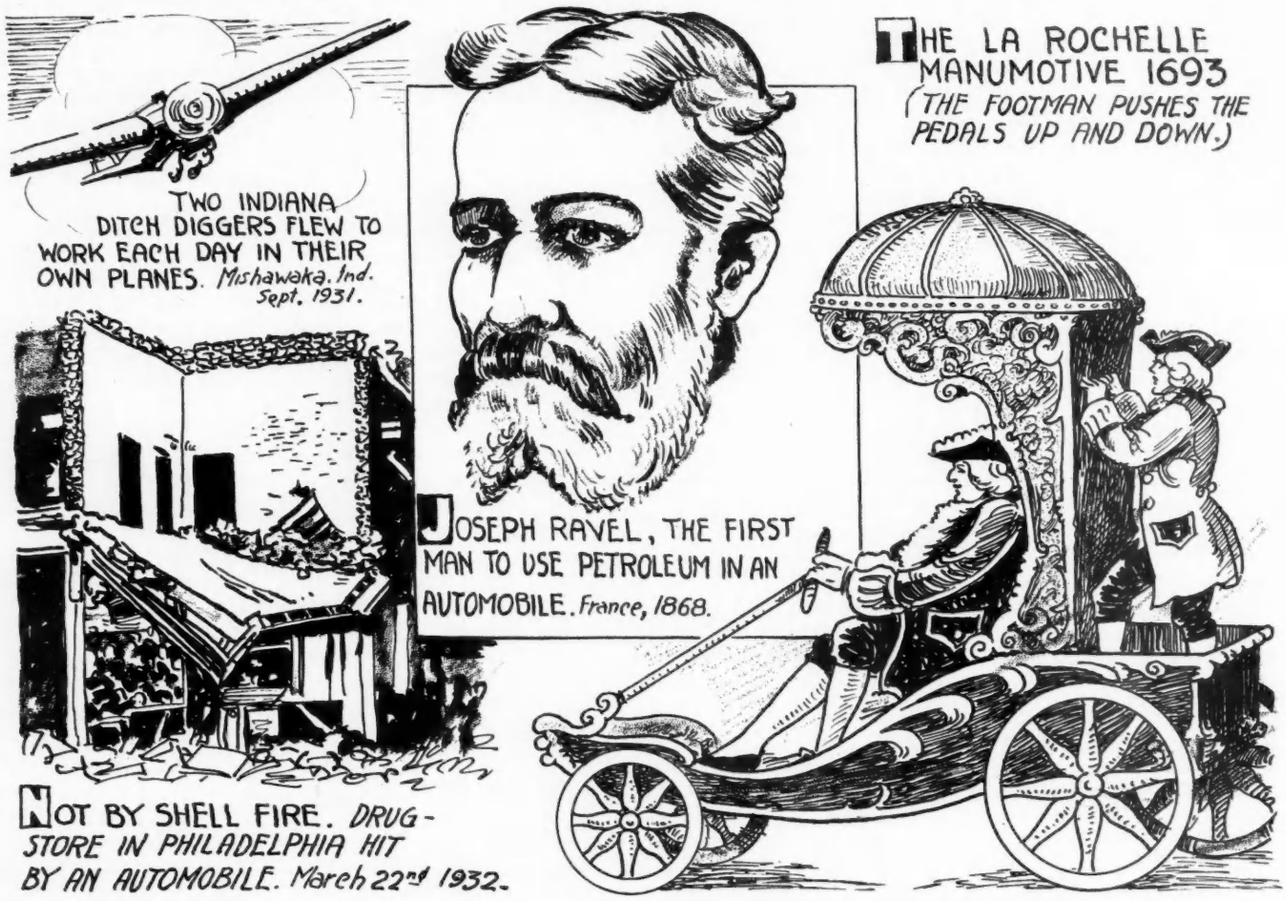
THE power which can be developed in an automotive engine is proportional to its mass rate of oxygen consumption."

This statement summarizes the results of research at the Bureau of Standards during the last 15 years and furnishes an interesting contrast to the complex formulas developed to account for the effects of various atmospheric factors on engine performance. This simple formula materialized when results of the final research, that of the effect of humidity, were considered, together with results of earlier work, on the effects of other atmospheric factors on engine performance.

Previous work had verified the quotation herewith over wide ranges of temperature and air pressure. The latest work, which will be discussed in a Technical Report of the National Advisory Committee for Aeronautics, has proved the truth of the summary over a wide range of humidity.

The above finding, of course, implies that moisture in the air, instead of increasing the power of an engine, as has so often been claimed, actually reduces it, for when air contains water vapor it contains less oxygen per unit of mass.

Automotive Oddities—By Pete Keenan


TWO INDIANA DITCH DIGGERS FLEW TO WORK EACH DAY IN THEIR OWN PLANES. Mishawaka, Ind. Sept. 1931.
JOSEPH RAVEL, THE FIRST MAN TO USE PETROLEUM IN AN AUTOMOBILE. France, 1868.
THE LA ROCHELLE MANUMOTIVE 1693
(THE FOOTMAN PUSHES THE PEDALS UP AND DOWN.)
NOT BY SHELL FIRE. DRUG-STORE IN PHILADELPHIA HIT BY AN AUTOMOBILE. March 22nd 1932.

Write us if you know an "Oddity"

The NEWS TRAILER

Henry Ford, candidate to succeed himself as trustee of the Board of Education for School District No. 5, Dearborn, Mich., was in Washington this week to visit Mr. Hoover, and, with Mrs. Ford, to look at a "lot of flowers" in Virginia. Mr. Ford admitted that his company was "selling all the cars we can build." He advocated leaving prohibition as it is, and renewed his plea that factory workers should be permitted to raise their own vegetables.

On the last point the International Harvester Co. seconded him by leasing a thousand acres of land in Chicago for its former employees to use as gardens. Tractors are at work preparing the soil. Seed will be furnished those unable to buy it. Each jobless man will be given one-quarter of an acre. Tools will be furnished by the company also.

Billy Arnold, Chicago boy, who made good at Indianapolis in 1930, will race in the opening race at the new Roby Speedway May 8. Arnold, injured last year at Indianapolis, is using the Roby race as a conditioner preparatory to the Memorial Day event this year.

Executives and operating officials of 14 railroads and street railway systems, representatives of the Amtorg Trading Corp., and a number of engineers in various lines, have inspected the new Budd-Micheline pneumatic-tired rail car since its initial public demonstration late in February.

An agreement for cooperation between the Greyhound Bus Lines and the Eastern Air Transport System has become effective. The arrangement is expected to have considerable effect in the immediate and adjacent territory to the airline, for it will mean that many cities not directly served with air transportation will be given rapid connections to the nearest airport of call. Thus each of the 27 cities served by the Eastern Air Transport System will be a key point in serving all centers of population within a radius of 100 or more miles.

The agreement between the airline and the bus system is that each will act as agent for the other, joint traffic promotion will be done, joint schedules and tariffs will be issued, and bus schedules will be coordinated with those of the transport planes.

NEWS

Move to Strike Excise-Tax Fails

Couzen's Amendment Defeated by Senate Finance Committee

WASHINGTON, April 28—Senator James M. Couzen's amendment striking out the proposed automotive excise tax was defeated in the Senate Finance Committee this afternoon by a vote of 5 to 12. Unless a vigorous fight is made on this point in the Senate, where the committee's report will be made soon, this tax will not be reconsidered but will become part of the law which is expected to be completed for the President's signature or veto some time during May.

Almost a year ago, Andrew Mellon, then Secretary of the Treasury, suggested that the automotive excise tax would be resorted to in an attempt to balance the Federal budget. Since then, the industry, under the leadership of the National Automobile Chamber of Commerce, the American Automobile Association, farmers' organizations and others interested in manufacturing and employment, has battled against the proposed levy.

The Senate Committee's recommendation is for three per cent tax on cars, two per cent on trucks and one per cent on parts and accessories. Last week Secretary of the Treasury, Ogden L. Mills, recommended the "former excise tax," a five, three and two-and-a-half per cent schedule.

Hupp Reports Loss

DETROIT, April 27—Hupp Motor Car Corp. reports a net loss of $596,176 after charges and depreciation for the first quarter of this year against net loss of $680,911 for the first quarter of last year.

Cadillac Names Dreystadt, Houser

Appointment of Nicholas Dreystadt to the position of works manager of the Cadillac Motor Car Co., succeeding A. U. Widman, resigned, has been announced by Lawrence P. Fisher, president.

Mr. Dreystadt has been general parts and service manager for the past six years.

Completing his education in Germany, Mr. Dreystadt received his early mechanical training in European automobile plants. He came to this country in 1912, and after four years of general shop work, joined the Cadillac retail sales force in Chicago.

Mr. Dreystadt's appointment is effective May 1. W. A. Houser, associated with him for many years, will succeed him as parts and service manager.

Studebaker Omits Common Dividend

Payment on Pierce-Arrow Preferred Also Passed by Directors

JERSEY CITY, N. J., April 27—Quarterly dividend on Studebaker common stock was omitted today by action of the directors. Regular dividend of $1.75 per share on the 7 per cent preferred stock was declared. Directors of the Pierce-Arrow Motor Car Co., meeting subsequently, passed the dividend of $1.50 due on the 6 per cent preferred stock of that corporation.

At the annual meeting of Studebaker stockholders on April 26, speaking of the Rockne car, A. R. Erskine, president of Studebaker, said:

"With it, we were able to sell 18,705 vehicles in the first quarter, compared with 17,194 last year, a gain of 8.7 per cent. The diminishing production of Studebaker and Pierce-Arrow cars caused the corporation to show a loss in its operations of the first quarter for the first time in the last twenty-one years. While predictions are dangerous at this time, it seems probable that sales of Rockne cars in the second quarter will substantially exceed the 6295 sold in the first quarter.

"In the matter of expenses further large savings have been made this year. Salaries of all officers and employees have been reduced from 5 per cent on amounts of $1,000 and under to 20 per cent on amounts of $5,000 and over, effective May 1."

Various economies, Mr. Erskine said, would produce $1,500,000 of savings annually, in addition to the savings previously put into effect.

The stockholders approved a proposal to reduce the company's common stock capital from $40 a share to $20, and to transfer $33,051,520 to surplus from capital.

All Speed Lanes Busy

Racing programs announced by the American Power Boat Association, the contest board of the American Automobile Association, the American Motorcycle Association, and other governing bodies, indicate that the 1932 season will be one of the busiest in the history of automotive sports.

International Class land-speed records continue to be remade by sixes and sevens at the Montlhery track in France. World's records have fallen.

Dates for the National Air Races in Cleveland have been set as Aug. 27 to Sept. 5, ending on Labor Day.

Activity by manufacturers shows renewed interest in the advertising and promotion possibilities of speed contests.

Durant N. J. Plant in Receivership

ELIZABETH, N. J., April 28 — The local plant of Durant Motors of New Jersey has been placed in the hands of a mortgage receiver until foreclosure proceedings are concluded, by an order of the New Jersey court of chancery, which is effective as of April 26. S. A. Young, Newark, was named receiver.

The Bayway Terminal, Inc., took over the property nearly a year ago for conversion into an industrial terminal, but abandoned it on March 1, under a court order, having encountered financial troubles.

Canadian Output Up

OTTAWA, April 25—Production of 8318 automobiles in Canada during March was the greatest for any month since last May, when 12,738 cars were made. This month's output exceeded by 50 per cent, the February total of 5477 cars which in turn was 47 per cent higher than the 3731 cars of the next preceding month and compares with 1299 cars made in March, 1931.

Dodge Campaigning

DETROIT, April 28—Regional meetings at which the spring merchandising campaign will be discussed will get under way shortly, according to information from Dodge Brothers. The campaign is built on the theme of making people dissatisfied with their cars through securing large numbers of floating power ride demonstrations. Newspaper advertising on this subject began April 19, and has been scheduled for some time ahead. In addition to national advertising Dodge is recommending solicitation of car owners by dealers by telephone and direct mail. Dodge is thus working toward increased dealer activity by aiding creation of demand for demonstrations. New York and Chicago regional meetings have already been held.

Hayes of Canada Control Passes

TORONTO, April 23—Shareholders of Hayes Wheels and Forgings Limited, have been notified that control of the company has now passed from the hands of the common to the preferred holders of the company's stock.

Hudson Sponsors Race Cars

INDIANAPOLIS, April 28 — Buddy Marr has entered two Hudson Specials, factory sponsored, in the 500-mile race to be run off May 30. Marr last year drove a Marr Special powered with a Hudson engine.

DeSoto, Plymouth Deliveries Gain

DETROIT, April 25 — DeSoto retail deliveries for the week ending April 9 were the second largest in the history of the company.

Retail sales for the first quarter of 1932 were 36 per cent greater than the corresponding period of last year.

During March DeSoto climbed into fourth place in the automobile business, from thirteenth position a year ago.

Shipments of new Plymouth cars to DeSoto, Dodge and Chrysler dealers for the week ending April 16 were 5014, an increase of 34.9 per cent over the preceding week, according to H. G. Moock, general sales manager of the Plymouth Motor Corp.

Czech Merger Dissolved

After an existence of only two months the long heralded Motor Corp., a new concern established by the Ceskomoraveka-Kolben-Danek Co. and the Skoda Works for the purpose of concentrating the production and sale of Praga and Skoda cars and trucks, was dissolved on March 3, according to the Department of Commerce. The decision to liquidate the firm was reached during a general meeting of the board of directors on March 2, 1932, after it was found that the two concerns could not continue to cooperate.

The shift back to their old organizations was made in one day.

Rail Agency to Carry Motor Freight

CHICAGO, April 25—The first step in the plan of Railway Express Agency, Inc., to broaden its activities into highway transportation of freight was indicated Friday in the filing of an application with the Illinois Commerce Commission for authority to operate a freight transport service within the corporate limits of Chicago. The agency proposes to act as a common motor carrier within the limits specified in its application and will establish itself, thereby, in direct competition with any and all forms of freight delivery by motor truck.

Parker Reports Profit

DETROIT, April 25 — Parker Rust Proof Co. has reported for quarter ended March 31, 1932, net profit of $96,116 after charges and depreciation, but before Federal taxes and preferred dividends. This compares with $208,830 in the first quarter of 1931.

British Austin Has 93-in. Wheelbase

by M. W. Bourdon

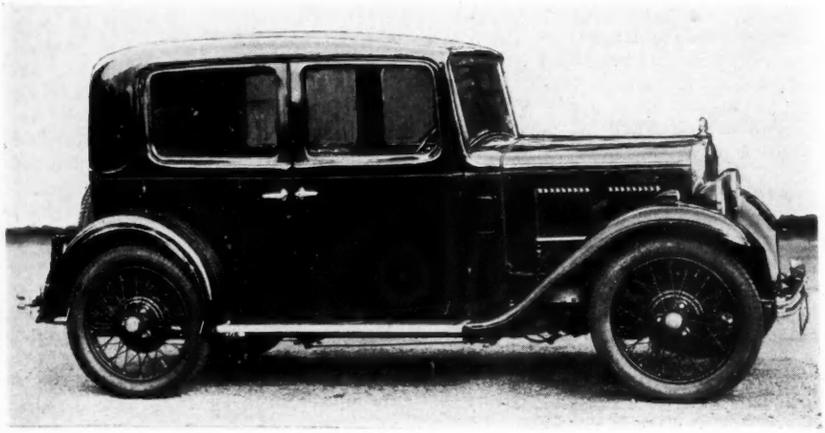
LONDON, April 17 *(by mail)* — A new model was recently introduced by Sir Herbert Austin at a gathering of dealers held at the Northfield (Birmingham) plant of the Austin Motor Co. It is intended to fill a gap that has long existed in the range of Austin passenger cars and to fulfill a demand for a type that is rapidly becoming the most popular of any with British car buyers.

The new car has a 4-cylinder L-head engine with a bore and stroke of 2½ x 3½ in., dimensions giving it a piston displacement of 69 cu. in. which compares with the 45 cu. in. displacement of the Austin Seven, the model upon which the design of the original American Austin Midget was based. The wheelbase is 93 in., track 45 in., and with a roomier four-passenger body than is associated with cars of this type in general, it weighs approximately 1730 lb. With his persistent appeal to dealers to be 100 per cent Austin, Sir Herbert could hardly refrain from giving them an additional model to handle of a type for which the demand has increased by leaps and bounds during the past six or eight months.

The latest model will not have the glamour of a particularly low price attached to it, for it will be offered with only one style of body (a four-door sedan) having de luxe equipment at £168. This figure compares with £120 in the case of the 8 hp. Ford, but the specification and body work of the two cars differ to an extent that appears to justify the higher price of the Austin.

The following table shows how this new Austin compares with the Austin Seven, 8 hp. Ford and certain prominent British models with which it will be in direct competition.

Make and Model		Piston Displacement cc.	Wheelbase in.	Track	No. of Speeds	Type of Sedan Body: Doors	Lights	Price £
Austin	7	747	75	40	3	2	4	118-128
do.	10	1125	93	45	4	4	4	168
Crossley	10	1122	108	48	4	4	4	265
Ford	8	940	90	45	3	2	4	120
Hillman	10	1184	92	48	3	4	6	155-175
Morris	8	847	91	42	3	4	6	152
Singer	9	848	90	44	4	4	6	167
Standard	9	1005	90	44	3	4	6	155-169
Triumph	9	1018	87	41	4	4	6	197



New Austin has L-head engine with displacement of 69 cu. in.

Steel Demand Comes Out Slowly

Increase Looked for in May Despite Bad Seasonal Trend

NEW YORK, April 28—Youngstown district rolling mills continue to moderately expand their operating schedules as the result of demand from automotive parts makers. Quite a little of the incoming business is for material for Ford stamped parts, but this is singled out for mention chiefly because it was so late in materializing and General Motors and Chrysler business has fully as large a share in the improvement. Pittsburgh and Cleveland district mills have not been doing quite so well in automotive orders as have the Youngstown district plants, although some wheel and rim as well as fender and body stock has been ordered from Cleveland district rollers.

Some of the beneficial effect of better support of rolling mill schedules by automotive commitments on the showing made by ingot output is lost by declines in the general run of steel consumption. Aside from the demand for steel for public works there is very little activity in structural material and railroads are almost out of the market. Sales managers pin their hopes in further improvement in automotive steel demand in May, although in more normal years the seasonal downturn is looked for then. Prices are holding steady all along the line, but in some of the market's departments buying is in so small lots that a real test is wanting. Deliveries on low-priced contracts for steel bars, now quoted at 1.60c, Pittsburgh, are supposed to come to an end on Saturday and the market may reveal more adequately in May the attitude of buyers.

Pig Iron—Several round tonnages are being negotiated for by automotive foundries in the Cleveland market. No. 2 foundry and malleable for delivery into outside territory are being quoted by Lake furnaces at $14.50 @ $15, furnace.

Aluminum—Quiet and unchanged.

Copper—In some quarters considerable confidence in the market's future is voiced as the result of the Senate Finance Committee having voted 10 to 8 for an import "tax" on copper. The rate of 5 cents per pound has been suggested in connection with this plan. In the "outside" market electrolytic was offered at as low as 5⅝ cents, Connecticut Valley, with producers quoting 5¾ cents. In view of the heavy stocks on hand it is problematical to what extent a "tax" on imported copper would affect the market.

Tin—Tin scored sharp advances on reports of further curtailment of output by the International Tin Committee, the reported reduction being 20,000 tons effective June 1. Output during the second half of the year is planned at the rate of about 90,000 tons annually, compared with a normal rate of 150,000 tons. The week's opening price was 20⅛ cents.

Lead—Steady and moderately active.

Zinc—Quiet and easy.

Bendix Meeting Postponed

CHICAGO, April 25—Meeting of directors of Bendix Aviation Corporation originally scheduled for today has been postponed until May 23, at which time action will be taken on the common dividend payable July 1. The dividend was reduced to 15 cents from the former quarterly rate of 25 cents with the April payment. Officials of the company have stated that the quarterly income statement, available in a week or two, will show a profit, but whether earnings for the quarter covered the 15 cent dividend has not been ascertained.

Borg-Warner Profits

CHICAGO, April 25—Consolidated income of Borg-Warner Corp. for the quarter ended March 31 was $170,220 after all charges, equal after preferred dividends to 9 cents a share on 1,168,694 shares of $10 par common stock. This compares with net income of $329,792, equal after preferred dividends to 21 cents a share on 1,230,802 common shares in the corresponding period last year.

Allied Motor Has Loss

CHICAGO, April 25—Allied Motor Industries and subsidiaries had net loss of $107,024 for 1931 before a loss of $2,046,228 arising from reduction in value of investments in affiliated companies, the annual report reveals. This compares with net loss of $394,580 in 1930 before write off of bond discount and expense totaling $122,954.

Timken Axle Reports

DETROIT, April 25—Timken-Detroit Axle Co. and subsidiaries has reported net profit of $328,328 after depreciation, interest and taxes for year ended Dec. 31, 1931, equivalent after 7 per cent preferred dividends, to 13 cents a share on 992,096 shares of common stock of $10 par value, and compares with a net profit of $842,237, or 62 cents a share in the previous year.

Current assets as of Dec. 31, 1931, were $8,658,316, including $3,487,842 in cash and marketable securities, against current liabilities of $1,094,927, compared with current assets of $8,447,052 and current liabilities of $509,806 in the preceding year.

General Tire Passes Common Dividend

AKRON, April 26—Directors of General Tire & Rubber Co. have voted to pass the common stock dividend of 25 cents a share due April 1, it was announced here this week. The company paid the first quarterly dividend this year.

I. H. C. Declares Dividend

CHICAGO, April 25—Regular quarterly dividend has been declared by International Harvester Co.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

NEW YORK, April 27—The warmer weather last week stimulated general retail trade, but the most activity was in seasonal lines. The best retail reports have been received from department stores in the Central West. There was a moderate improvement throughout the country in agricultural implements, building materials, and seasonable hardware. The heavy industries remained dull.

GUARANTY INDEX

The Guaranty Trust Company's preliminary index of business activity for March stood at 54.7, as against 56.4 for the preceding month and 72.3 for a year ago. The company's index of wholesale commodity prices on April 15 stood at 38.8, as against 40.5 a month earlier and 51.1 a year earlier.

DEPARTMENT STORE SALES

Sales of department stores in the metropolitan area of New York from April 1 to April 15 were 20.8 per cent below those in the corresponding period last year, according to the Federal Reserve Bank of New York.

CAR LOADINGS

Railway freight loadings during the week ended April 9 totaled 544,806 cars, which marks a decrease of 155 cars below those during the preceding week, a decrease of 192,466 cars below those a year ago, and a decrease of 366,510 cars below those two years ago.

EMPLOYMENT AND EARNINGS

The level of employment in 16 industrial groups during March, according to the Bureau of Labor Statistics, decreased 1.5 per cent, while combined earnings declined 2.4 per cent.

U. S. FOREIGN TRADE

Exports from the United States during March totaled $156,000,000, as against $153,939,000 during February and $235,899,000 a year ago. Imports amounted to $131,000,000, as against $130,978,000 during February and $210,202,000 a year ago.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended April 23 stood at 61.8, as against 62.4 the week before and 62.5 two weeks before.

BANK DEBITS

Bank debits to individual accounts outside of New York City during the week ended April 20 were 30 per cent below those a year ago.

STOCK MARKET

The stock market last week continued its downward course, with only occasional reactions. The lack of any tangible improvement in trade and the further liquidation of market leaders influenced the course of prices downward. Trading was on a reduced scale; and most issues closed the week with net losses, some of which were large.

RESERVE STATEMENT

The consolidated statement of the Federal Reserve banks for the week ended April 20 continued to show the trend of recent weeks, namely, a decline in holdings of bills and an increase in holdings of Government securities. Holdings of discounted bills decreased $64,000,000, and holdings of bills bought in the open market declined $6,000,000. Holdings of Government securities increased $93,000,000. The reserve ratio on April 20 was 69.2 per cent, as against 69.4 per cent the week before and 70.8 per cent two weeks before.

Willys Drops Warsaw Post

(Continued from page 661)

At this stage of the company history a banker group with representative Toledoans in the lead took charge of the company to work it out of its indebtedness.

Active management of the company was placed in charge of Charles B. Wilson, leader in the Wilson Foundry & Machine Co. of Pontiac, makers of Knight engines used in the Willys-Knight cars.

Under this management the company did a lot of housecleaning of its heavy inventory and debt so that by the beginning of 1922 it was looking forward to a steady year with notes payable reduced to $18,250,000, accounts payable down to $2,150,000, and inventory down to $19,000,000 with prospect of all surplus and obsolete material being cleaned out by April, 1922. The company was opening 1922 with about 4000 dealers, 800 having been added in December.

At the annual meeting in April, 1922, the stockholders were asked to authorize the placing of a mortgage for $17,500,000 which would clean up the bank debt and to mature not later than Dec. 1, 1923. Preferred stockholders were in control of the company at this time but they were cooperating with the bankers.

Willys-Overland had increased its common stock by $25,000,000 in May, 1920, to aid in financing the post-war boom and also to assist in getting control of Moline Plow.

Liquidation of the Willys Corp. began to get under way actively in 1922. The Electric Auto-Lite property was purchased by C. O. Miniger for $5,000,000 in cash. Durant bought the Elizabeth, N. J., plant for $5,525,000 cash. The New Process Gear Corp., at Syracuse, N. Y., brought $2,000,000.

The Willys Corp. held 739,866 shares of common stock of Willys-Overland Co., which represented a third of that outstanding, or virtual control of the company. It was being quoted at about 8½ a share in the the spring of 1922.

When this block of stock came up for sale there developed a contest for its purchase which was aired in the bidding before Judge John Clark Knox of the Federal District Court in southern New York.

Attorney Thomas H. Tracy, head of the law firm of Tracy, Chapman & Welles, was spokesman for the group of Toledoans including George M. Jones and C. O. Miniger, and he submitted a bid for the stock. Apparently John N. Willys, who had tried to remain aloof from any internal differences, swung over to this group.

The plant then was producing about 1000 cars a day and market prices for the common stock were ranging from 8 to 10.

Col. Francis G. Caffey, receiver for the Willys Corp., appeared to favor the Tracy bid. Finally, it was accepted by the court and the stock turned over to this Toledo group.

It was current at the time that John N. Willys had been won to the plan by the offer of an option to convey the stock to him at $12 a share within a specified period of time. The group of Toledoans associated in this Tracy bid, therefore, put up the funds to buy back the company for Mr. Willys, making a profit of several dollars a share. Under the powerful drive of Mr. Willys' leadership the common stock had risen in market value to the 20's before he exercised the option.

In 1924 the company had worked its debt down to $10,000,000, at which time a bond issue was floated to fund it and this has been reduced at a rate of $1,000,000 a year since that time.

Readjustments of the capital stock were made so that now there is outstanding 3,000,000 shares of $5 par value. Back preferred dividends were liquidated through payments of $29.75 in common stock in 1926.

In the period which followed when John N. Willys took active control, moved back to Toledo, built a home in Ottawa Hills, and traveled extensively boosting the sales of Willys-Overland cars, earnings of the company were on the upgrade and dividends on common amounting to 60 cents in 1928, $1.20 and 5 per cent stock in 1929, and 30 cents in 1930 were paid.

During the early part of 1929 a pool in Willys-Overland common stock was formed and Chicago interests were said to be ready to back Toledoans in promoting an upward movement. The stock had swung between 10 and 35 in 1928 and 1929.

A Toledo group of which C. O. Miniger, president of the Electric Auto-Lite Co., appeared to be the leader, were said to be dissatisfied with the operation of the stock pool, and with T. H. Tracy arranging the legal details, began a movement to obtain for Toledo the control of the company by the purchase of the Willys stock.

At this time Mr. Willys was understood to have 800,000 shares of common.

When negotiations were warm Mr. Willys showed up in Toronto, Canada, and asked the Toledoans to come over and deal, and is understood to have set a price of $25 a share or $20,000,000 for the stock. This was approximately 25 per cent of the shares outstanding and constituted the working control. Remaining shares were scattered among 6000 to 10,000 holders.

The stock which Mr. Willys acquired at $12 a share he sold at $25. He had sold at the peak of the market.

Mr. Willys remained as chairman of the board of directors and was appointed ambassador to Poland early in 1930. At that time he was reputed to be the holder of 50,000 or more shares of the preferred stock of which there is $12,621,700 outstanding, giving him virtual control of the company when dividends due July 1, 1932, are passed, thus throwing the voting control of the company to the preferred stock.

During the last three years C. O. Miniger has been chairman of the executive committee and L. A. Miller, with the company for a number of years, president. J. H. Gerkens, vice-president and treasurer, and A. B. Qualy, secretary, were both with the company under the long Willys regime.

Ford of Canada To Produce in May

EAST WINDSOR, ONT., April 26—Following a meeting of shareholders at the plant of the Ford Motor Co., Canada, Ltd., yesterday, Wallace R. Campbell, president and treasurer, announced that production will start at once, the schedule calling for 5000 cars to be produced during the month of May.

Mr. Campbell pointed out to stockholders that although no dividend was declared, it has not been passed, and as it is not due until June the directors do not care to commit themselves at the present time, as to whether or not conditions at the end of the second quarter would warrant a declaration.

George H. Hannum

George H. Hannum, whose long career in the automotive industry included four years as president and general manager of the Oakland Motor Car Co., died in Philadelphia April 16. At the time of his death Mr. Hannum was general manager of the Heintz Mfg. Co., Philadelphia. In 1925 Mr. Hannum organized the George H. Hannum Co., Milwaukee, to manufacture heavy-duty steering gears. The company was sold in 1930, and Mr. Hannum returned to Pontiac, Mich. In 1931 he joined the Heintz Mfg. Co. in Philadelphia.

Seagrave Reports Loss

COLUMBUS, OHIO, April 25—Net loss of $60,346.46 for the year ended Dec. 31, 1931, for the Seagrave Corp., manufacturer of motor-driven fire-fighting engines, was reported to stockholders by H. B. Spain, president.

Robert J. Maroney and Jerome A. Newman, both of New York, were replaced on the board of directors by Arthur A. Kloss, assistant secretary and treasurer, and Franz Stone, son of Julius Stone, president of the board. Gross sales for the year amounted to $1,158,684.

GMC Earns 17 Cents in Quarter

Fails to Make Dividend Requirement But Cash Position is Good

NEW YORK, April 25—The General Motors Corp. finished its business quarter ending March 31 with net earnings a third of what they were in the corresponding quarter of last year. The cash position of the corporation is improved, however, as compared with the same point in 1931. Wall Street sentiment indicates that when G. M. directors meet on May 4, there may be another revision of the dividend rate of the common stock, to conserve the liquid assets of the corporation. The current dividend requirement is 50 cents a common share, for which the present quarter's earnings furnish 17 cents a share.

The statement of Alfred P. Sloan, Jr., president of General Motors, announcing the earnings for the first quarter follows:

"Net earnings of General Motors Corporation for the quarter ended March 31, 1932, including equities in the undivided profits or losses of subsidiary and affiliated companies not consolidated, amounted to $9,693,027. This compares with earnings of $28,999,409 for the corresponding quarter a year ago. After deducting dividends of $2,344,207 on the preferred stock, there remains $7,348,820, being the amount earned on the common shares outstanding. This is equivalent to 17 cents per share on the common stock and compares with 61 cents per share earned in the first quarter of 1931.

"Cash, U. S. Government and other marketable securities, at March 31, 1932, amounted to $186,777,639, compared with $205,029,119 at Dec. 31, 1931, and $179,133,114 at March 31, 1931. Net working capital at March 31, 1932, amounted to $271,536,282, compared with $273,915,923 at Dec. 31, 1931, and $292,723,601 at March 31, 1931.

"During the quarter ended March 31, 1932, General Motors dealers in the United States delivered to consumers 143,514 cars, compared with 231,881 cars in the corresponding period of 1931. Sales by General Motors Operating Divisions to dealers in the United States during this period amounted to 166,304 cars, compared with 255,997 cars in the first quarter of 1931. Total sales to dealers, including Canadian sales and overseas shipments, amounted to 197,256 cars, compared with 304,547 cars in the corresponding quarter a year ago.

"A more detailed statement, including the balance sheet and income account, will be issued to stockholders in due course."

March Vehicle Output Slightly Above February

WASHINGTON, April 28—The production of motor vehicles in the United States in March rose to 118,959 units from 117,418 in February, according to the Bureau of the Census. The passenger car output was 99,325 as against 94,085 and the truck production was 19,560 as compared with 23,308. The output of taxicabs rose to 74 from 25.

Motor Products Reports Loss

DETROIT, April 26—Motor Products Corp. has reported for quarter ended March 31, 1932, a net loss of $179,526 after all charges and depreciation, compared with net profit of $92,687 in the first quarter of 1931.

Exports, Imports and Reimports of the Automotive Industry for the Month of March, 1932, and 3 Months Ended With March

	Month of March				Three Months Ended March			
	1932		1931		1932		1931	
	Number	Value	Number	Value	Number	Value	Number	Value
Automobiles, parts and accessories	....	$9,346,049	....	$18,494,021	....	$23,543,446	....	$48,920,157
Motor trucks and buses except electric (total)	3,183	1,373,075	6,002	3,112,811	7,811	3,447,421	14,831	7,980,781
Under one ton	245	61,666	1,916	700,571	936	238,550	3,418	1,251,048
One and up to 1½ tons	2,595	949,515	3,467	1,608,713	6,148	2,327,474	9,045	4,273,954
Over 1½ tons to 2½ tons	209	148,716	438	520,401	455	386,382	1,800	1,522,623
Over 2½ tons	124	207,428	135	257,383	215	399,610	441	868,382
PASSENGER CARS								
Passenger cars except electric	5,541	3,192,614	11,524	6,714,998	14,951	8,281,698	29,299	17,550,932
Low price range $850 inclusive	4,743	2,157,090	9,389	4,402,837	12,817	5,784,364	23,426	10,935,424
Medium price range, over $850 to $1,200	377	375,086	1,350	1,281,345	1,304	1,269,331	3,692	3,545,329
$1,200 to $2,000	246	319,891	413	574,453	443	588,336	975	1,426,738
Over $2,000	110	313,505	147	367,787	210	567,621	558	1,370,606
PARTS, ETC.								
Parts, except engines and tires	....	.....	....	.....	....	.....	....	.....
Automobile unit assemblies	....	2,693,350	....	5,090,301	....	6,378,837	....	14,010,478
Automobile parts for replacement (n.e.s.)	....	1,265,260	....	2,788,279	....	3,353,570	....	7,474,968
Automobile accessories	....	249,843	....	374,957	....	609,479	....	986,728
Automobile service appliances (n.e.s.)	....	192,182	....	419,286	....	495,623	....	1,001,731
Trailers	17	21,089	221	27,583	47	40,430	287	70,888
Airplanes, seaplanes and other aircraft	12	192,624	9	49,770	32	357,627	28	321,391
Parts of airplanes, except engines and tires	....	68,646	....	200,859	....	227,106	....	560,911
BICYCLES, ETC.								
Bicycles	50	1,148	84	2,198	352	8,413	521	13,861
Motorcycles	334	73,552	1,256	309,344	823	185,539	2,055	501,762
Parts and accessories, except tires	....	36,837	....	62,186	....	89,353	....	164,093
INTERNAL COMBUSTION ENGINES Stationary and Portable								
Diesel and Semi-Diesel	3	3,063	63	60,882	12	61,945	117	110,587
Other stationary and portable:								
Not over 10 hp.	297	23,051	893	71,278	854	61,010	2,551	203,872
Over 10 hp.	67	33,008	508	271,236	172	122,482	962	551,115
Automobile engines for:								
Motor trucks and buses	137	27,139	853	131,865	696	115,166	2,072	291,793
Passenger cars	2,749	255,546	2,768	235,149	5,421	523,325	5,836	489,569
Tractors	....	....	....	....	5	1,426	2	1,007
Aircraft	41	159,765	46	235,481	65	198,604	76	422,284
Accessories and parts (carburetors)	....	126,413	....	208,129	....	592,220	....	591,914
IMPORTS								
Automobile chassis (dutiable)	33	34,779	49	60,486	99	98,987	123	112,765
Other vehicles and parts for them (dutiable)	....	7,376	....	6,609	....	10,361	....	12,650
REIMPORTS								
Automobiles (free from duty)	25	27,538	14	12,518	37	38,150	47	57,225

Sales Managers Plan New Efforts

Detroit Meeting Considers Effect of Models, Options

DETROIT, April 26—Campaigns to still further increase the present rate of sales that are stepping up with the spring buying season with plans to strengthen the dealer organizations were approved by the sales managers committee of the National Automobile Chamber of Commerce at its session, presided over by Richard H. Grant, vice-president of the General Motors Corp.

The selling executives discussed the growing complexity of too many models and options that are complicating production and perplexing the dealers who have difficulty stocking anything like a complete line.

New service problems were reviewed and will provide the main topic for the next meeting on May 10, to which a committee of service managers will be invited.

The reports showed improved selling as a result of the sales offensive that has been in progress, with business somewhat better in the Eastern territory, but with a general increase in buying everywhere over last month.

There was universal regret expressed at the meeting over the sudden death of Samuel A. Miles, veteran manager of Automobile Shows. A cable of condolence was sent to Mrs. Miles.

Georges-Marie Haardt

Georges-Marie Haardt, vice-president of the Citroen Motor Works (France), who had entered upon a trip of exploration through Central Asia, of which full details were printed in *Automotive Industries*, Oct. 24, 1931, died in Hongkong, China, on March 15, aged 48 years. The cause of his death was an attack of pulmonary grippe. Haardt, who was a Belgian by birth and a naturalized Frenchman, had been connected with the automobile industry in France since 1906. In 1908 he was made general manager of the Mors Automobile Company by Andre Citroen, then president of that company, and he acquitted himself so well there that Citroen in 1914 put him in charge of his new plant. In 1926 he became a vice-president of the Citroen firm. Haardt became known to the general public chiefly through his motor tours through undeveloped regions, undertaken for the dual purpose of exploration and propaganda, of which he made two through Central Africa, and he had almost completed his third and greatest undertaking of the kind, through Central Asia across the Pamir Mountains, when death overtook him.

Goodyear Making Rail-Car Tires

AKRON, April 26—Goodyear Tire & Rubber Co. has launched into a new field of rubber-tire production this week following the completion of tests of their first pneumatic casings for railroad coaches. Goodyear is to manufacture the tires in this country under Michelin patents, and the E. G. Budd Mfg. Co. firm of Philadelphia will make the coaches.

The new tire carries 85 lb. of air pressure and has provided its ability to give long service on steel rails. Goodyear officials have announced following tests on iron wheels revolving at high speed and on actual runs on railroad tracks here.

The casing covers a kidney-shaped inner tube which fits around a rubber-covered aluminum casting fastened to the center of the rim which prevents the tire from going flat.

Auto-Lite Reports Profit

TOLEDO, April 27—Electric Auto-Lite Co. has reported profit of $547,681 after all charges and Federal taxes for March quarter, equal to 53 cents a share on 897,509 shares of common after preferred requirements. This compares with $1,096,916 or $1.23 a share in same quarter last year. More than $92,000 was cut from general and sales costs in the first quarter this year. Gross profit and other earnings for the first quarter of 1932 amounted to $1,053,484 after depreciation. Administrative and general expense was $505,803.

Ford Units to Discuss Division of Territory

DETROIT, April 27—A proposed plan under which Ford Motor Co. of Canada will produce eight-cylinder cars for all territories not supplied by the American company is to be discussed at a conference between Wallace R. Campbell, president and treasurer of Canadian Ford and officials of the British company. Mr. Campbell sails May 21. Under the arrangement the British company would supply the territory covered by the Canadian company on the new Ford midget cars. Mr. Campbell will be accompanied by R. S. Milliken, export manager of Canadian Ford company.

Ainsworth Reports Loss

DETROIT, April 27—Ainsworth Mfg. Co. reports net loss of $49,257 after all charges for first quarter, compared with net loss of $35,233 first quarter last year.

+ + CALENDAR OF COMING EVENTS + +

FOREIGN SHOWS

Tel. Aviv, Palestine (Levant Fair) ..... April 7-30
Zagreb, Jugoslavia, Automobile Salon ..... April 23-May 2
Peznan, Poland, International Fair ..... May 1- 8
Dublin, Commercial ..... May 4- 7
Budapest, International Fair ..... May 7-16
Buenos Aires, Automobile Show ..... May 20-29
Belfast, Commercial ..... May 25-28
Bordeaux, Fair ..... June
Cork, Commercial ..... June
Inverness, Commercial ..... June 21-24
Southampton, Commercial ..... July 5- 9
Llandrindod, Wales, Commercial July 20-22
London, Olympia Show ..... Oct. 13-22
Glasgow, Scottish Motor Show ..... Nov. 11-19

CONVENTIONS

American Foundrymen's Asso., Detroit (Annual) ..... May 2- 5
American Society Mechanical Engineers (Management Div.) Philadelphia ..... May 2- 6
American Soc. Mec. Engineers, Detroit ..... May 4- 5
National Foreign Trade Council, Honolulu (Annual) ..... May 4- 6
American Gear Mrs. Assn., Sixteenth Annual Meeting, Cleveland ..... May 12-13
U. S. Chamber of Commerce, San Francisco, Cal. ..... May 16-20
American Iron & Steel Institute, New York (Semi-Annual) ..... May 19
National Battery Mfrs. Assn., Chicago, Ill. ..... May 19-20
Automotive Engine Rebuilders Assoc., Indianapolis ..... May 30-June 2
Natl. Automobile Chamber of Commerce, New York (Annual Meeting) ..... June 2
American Soc. Mechanical Eng. (Natl. Aeronautic Meeting) Buffalo ..... June 6- 8
American Soc. Mec. Eng. (Natl. Oil & Gas Meeting) State College, Pa. ..... June 8-11
Pacific Coast Aero. Meeting (A. S. M. E.), Berkeley, Calif. ..... June 9-10
Soc. of Automotive Engineers, White Sulphur Springs (Summer Meeting) ..... June 12-17
American Society for Testing Materials, Atlantic City (Annual Meeting) ..... June 20-24
Amer. Soc. Mechanical Engineers, Bigwin, Canada, (Semi-Annual Meeting) ..... June 27-30
Natl. Association of Taxicab Owners, Chicago ..... July 7- 8
Natl. Team & Motor Truck Owners Assoc., Chicago, (Annual) ..... July 17-19
National Team & Motor Truck Owners Assn., Detroit ..... July 17-19
S.A.E. Aircraft Meeting, Cleveland ..... Aug. 30-Sept. 1
American Society Mechanical Engineers, Cleveland, O., (Machine shop practice meeting) ..... Sept. 12-17
American Trade Association Executives, Atlantic City, (Annual) ..... Sept. 15-17
Natl. Assoc. of Motor Bus Operators, Chicago ..... Sept. 22-23
Amer. Society for Steel Treating, Buffalo ..... Oct. 3
National Safety Council, Washington, D. C. ..... Oct. 3- 7
American Society Mechanical Engineers, Buffalo, N. Y., (Natl. Iron and Steel Meeting) ..... Oct. 3- 8
S. A. E., Annual Transportation Meeting, Toronto ..... Oct. 4- 6
American Gas Association, Atlantic City, (Annual) ..... Oct. 10-14
American Society Mechanical Engineers, New York City, Annual Meeting) ..... Dec. 5- 9
Natl. Exposition of Power & Mechanical Engineering, New York ..... Dec. 5-10

RACES

Indianapolis ..... May 30
Detroit ..... June 5
Altoona ..... June 12
Roby, Ind ..... June 19
Altoona ..... Sept. 5

Fellows Announces . . . .

A NEW
HELICAL CUTTER SHARPENING MACHINE

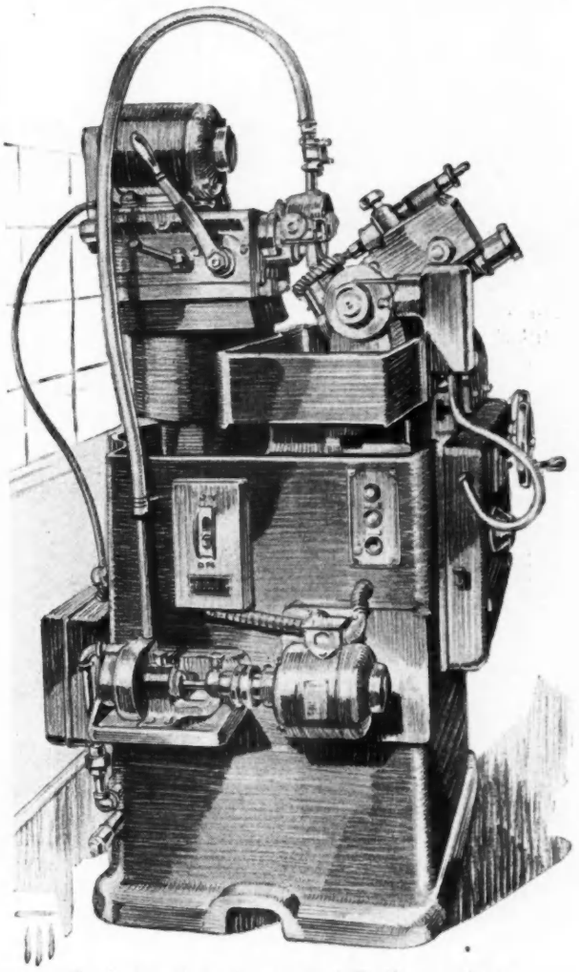
Fully Automatic . . .
. . . and With . . .
Complete Electrical Control

WITH this new Helical Cutter Sharpening Machine your resharpening of Fellows Improved Helical Cutters will be rapid, accurate, and independent of the skill of the operator..

The machine is FULLY AUTOMATIC. All the operator has to do after the machine has been set up is to: (1) Clamp cutter on the spindle, and (2) Feed the wheel down to the cutter. The indexing and reciprocation of the cutter for tooth-to-tooth sharpening are automatic, and the machine stops when the cutter has made a complete revolution. The electrical control is so arranged that the reciprocation of the table can be "jogged" for setting up simply by pushing a button.

This Fellows Helical Cutter Sharpening Machine is designed for rapid work. A pump-fed supply of coolant obviates any danger of burning the cutter, or of checking the cutting edge (so detrimental to high-speed, steel-cutting tools). You can grind rapidly without risk of damage.

It has every advantage over hand-operated sharpening fixtures—GREATER ACCURACY, HIGHER SPEED and POSITIVE CONTROL. Every helical gear producer will welcome this means of still further improving Fellows Cutter performance. Write: THE FELLOWS GEAR SHAPER COMPANY, 78 River Street, Springfield, Vermont (or Detroit Office—616 Fisher Bldg.).



Left-hand end view of Fellows Automatic Helical Cutter Sharpening Machine—easy to set up—fully automatic in operation.

FELLOWS
~ GEAR SHAPERS ~

State Gas-Tax Tolls Mount

(Continued from page 646)

by far the most heavily taxed commodity. The tax as I have shown would just equal the production cost. No industry in the land would meekly assent to that. If you don't believe me, try levying a 100 per cent tax on shoes or beefsteak or steel rails or radio sets and listen to the uproar that follows.

"On the broadest grounds of social and economic policy I urge against such a tax. For the sake of the comity that should exist between Federal and State Governments, you cannot afford to impose it. The states have few enough revenue sources; and many of them have just as pressing needs as you are seeking to meet. To take from a revenue that they discovered and that they have used so wisely for the public interest would be little short of assuming an attitude of contempt toward them. It would be disastrous to a great industry and a menace to the fiscal programs of the states.

"The burden of taxation must be spread so that other shoulders can help to carry the load; otherwise the entire fabric on which our taxation is built may collapse."

In 1931, for the first time in many years, some signs appeared of successful opposition to the rising tide of state taxation. The fight against higher levies on gasoline was waged strongly in many states by and for the automobile and truck owners of the country. But the end is not yet. The fight must go on. And it will go on, because the motoring public now is openly and vigorously opposed to such moves.

Voters in North Dakota on March 15 decisively defeated a proposal to increase that state's gasoline tax rate from 3 to 4 cents. Voters of Maine will decide a similar issue in September of this year, the 1931 Legislature having increased the rate to 5 cents from 4 cents after the proposal had been defeated in a referendum.

New York's Legislature succeeded in raising the state gasoline tax from 2 to 3 cents, the additional income to be used for general purposes, but only over strong opposition. Arizona's temporary 5 cent rate was continued beyond the expiration date, but efforts to prolong the 5 cent rate in Oklahoma met defeat and the tax was reduced to 4 cents. Pennsylvania Legislature refused to increase the 3 cent rate in that state.

The battle goes on in 1932. South Carolina's rate is still 6 cents, efforts to reduce it to 5 cents and increase it to 7 cents both having been unsuccessful so far. No increases resulted from attempts to raise the Illinois and Massachusetts rates from 3 to 5 cents, nor the Mississippi rate from 5 to 6 cents.

Not only has there been strong opposition to increases, but some state legislatures adopted resolutions protesting the proposal of the Federal Government to levy a tax on gasoline. Virtually all of the legislatures in session this year have considered amendments designed to strengthen existing gasoline tax laws and to permit more complete collection of revenue at existing rates.

The automobile business and its customers—the American motorists—stand to lose material sums if the stand against higher gasoline taxes is not successful.

Blocks Measured Quickly on Production Line

(Continued from page 657)

is extremely accurate in operation, one of its great advantages is that it need not be made with extreme accuracy, since the indicating clips can be readily adjusted after checking with a master head. A recheck against the master head is made after every ten or twelve cylinder-head checks.

The time required for this inspection operation is 55 sec. per head. Formerly each chamber was checked by means of a conventional burette and a plate glass over the chamber, which required approximately 15 minutes per head.

The device for checking for uniformity of cylinder-wall thickness after machining is illustrated in Fig. 2. It consists essentially of a horseshoe magnet whose main winding takes line current. On the poles of the magnet there are exploring coils, and these are connected, through a double-pole switch, to a millivoltmeter mounted on the post seen on the right of the operator. The poles of the magnet are plainly visible on the front of the device in the photograph. The magnetizing force of the main coil is of such magnitude that when the device is inserted into the bore of a cylinder, that portion of the cylinder wall between the poles is always magnetically saturated, so that the amount of flux passing through the exploring coils varies strongly with the wall thickness.

The flux density then, as indicated by the reading of the milli-voltmeter, is a direct measure of the cylinder-wall thickness. Measurements are accurate within about 1/64 in. It is obvious that the device can be readily moved around into any position within the bore, for a rapid checking of the entire cylinder.

Farm Tractors

Farm Tractors, by Archie A. Stone. Published by John Wiley & Sons, Inc., New York.

THIS book forms one of the Wiley Farm Series and is intended to meet the needs of those who own and operate tractors, and particularly the needs of students in this field. In the introductory chapter a brief history of farm tractor development is given, and the various types of tractor are classified. Then follows a chapter on The Tractor Factory in which all of the major factory processes employed in the production of tractors are illustrated and briefly described. The next several chapters are devoted to descriptions of the parts of a tractor and an outline of their functions. The remainder of the book deals with the operation and repair of tractors. The book is written in clear, simple language and will no doubt serve its purpose as a tractor-owner's and tractor-operator's handbook.

OUT OF THE DEPTHS OF MEDIOCRITY

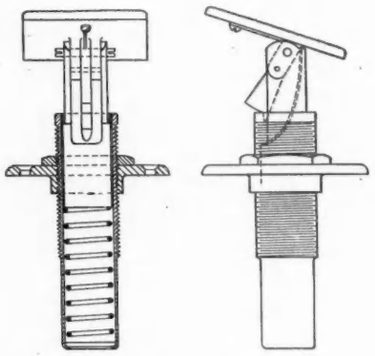
Is your car in the "grab bag" of price class? It deserves distinction, of course, but does it get it? Does it lead in sales volume? Mechanical excellence may give you satisfied owners and this is important but it is appearance which gives you buyers and enables you to prove this "unseen" value. Lift your car above competition. Stainless Trim will do it. Anyone will quickly recognize the enduring beauty and rich quality of Stainless Steel. It will act as a perfect contact point between motorist and manufacturer for it answers the owner's objection to plating which peels off and at the same time puts the maker in the position of one who offers a product free from the slightest flaw. Genuine Stainless Steel is manufactured only under the patents of American Stainless Steel Co., Commonwealth Building, Pittsburgh, Pa.

STAINLESS STEEL

NEW DEVELOPMENTS
Automotive Parts, Accessories and Production Tools

Depressible Foot Rest

The accompanying drawing illustrates a foot rest intended for use with accelerator buttons, to assure increased comfort for the driver. The device is the invention of George Bailhe of the Hall Electric Heating Co., Philadelphia. It comprises a pad with dia-



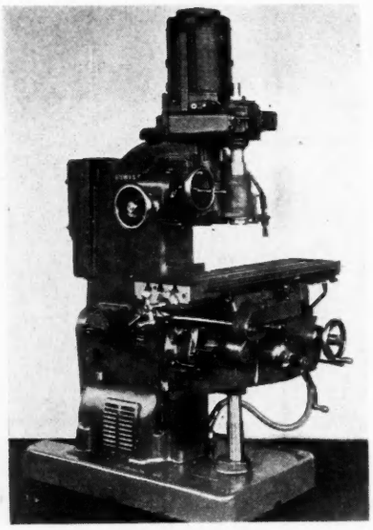
mond formations on its upper surface, which is swivel-mounted to the top of its stem. The stem is a sliding fit

(Turn to page 678, please)

Vertical Spindle Milling Machine

Brown & Sharpe Mfg. Co., Providence, R. I., has announced the addition of the No. 1 standard vertical spindle milling machine (motor driven) to their line of "Standard" machines.

The new machine provides a fast, sensitive unit for end mills and shell end mills, through spindle speeds ranging from 150 to 1800 r.p.m. in either direction. The high-speed series gives correct speeds when using small end mills from ⅛ in. to 3 in. diameter, of the new cutting alloys as well as high-speed steel. The back gear range, to 450 r.p.m., gives a smooth, powerful drive when using large cutters.



The machine is provided with a new type of motorization, an individual motor being used to drive the spindle, with a second motor furnishing power for table and spindle feeds. Both motors are controlled from a single push-button station, readily accessible from front and rear operating positions. Electrical controls and wiring are completely enclosed. All cutting movements of both table and spindle can be controlled from either front or rear operating position.

A fast, flexible type of speed change is available for the speed motor through a drum type control and back gear lever, conveniently located at the left front of the spindle head. These control levers are reached from either front or rear operating position.

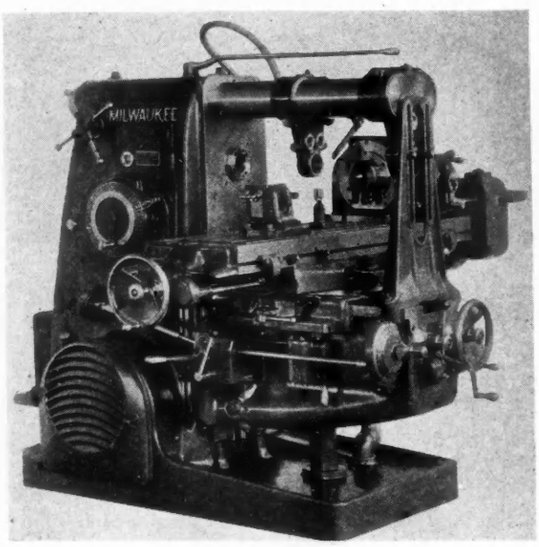
Power feed is provided for the spindle head, which can be readily disengaged when not in use. In addition, an unusually fast hand adjustment of 2 1/10 in. per revolution of the handwheel is available, so that less than two turns of the handwheel will move the head the entire length of its travel. As the head is counterweighted, this adjustment is easily made.

Knee Type Milling Machines

Kearney & Trecker Corp., Milwaukee, has added the No. 3 and 4 size machines to their line of new-style, knee-type milling machines. The line is now available in four sizes, Nos. 1, 2, 3 and 4, each of which is built in the universal, plain and manufacturing horizontal types, and in the plain and manufacturing, sliding-head, vertical types.

The 100-to-1 speed range permits surface speeds in either direction as low as 50 ft. per min. for a 12½-in. diameter cutter, and as high as 100 ft. per min. with a ¼-in. cutter. This broad range makes possible better performance with high-speed steel cutters, as well as permitting full use of the advantages offered by tungsten and tantalum-carbide cutters.

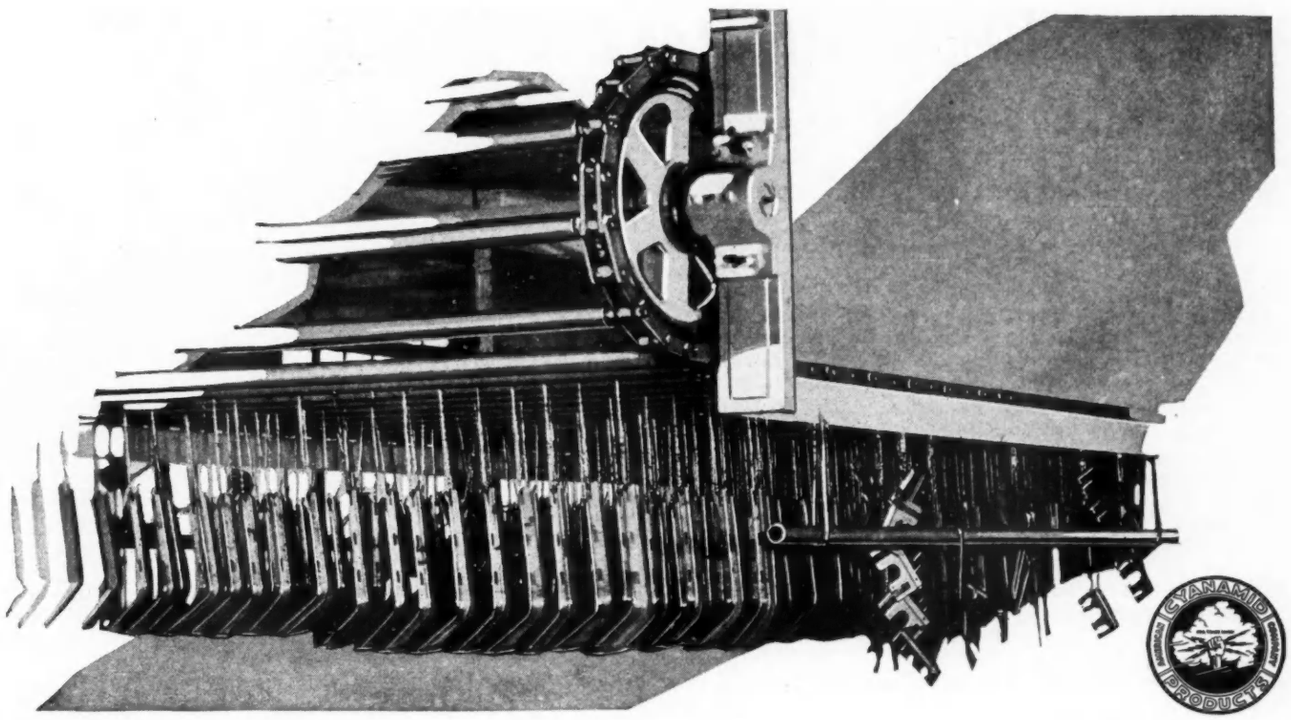
In order to avoid large gaps between increments, 27 speed changes



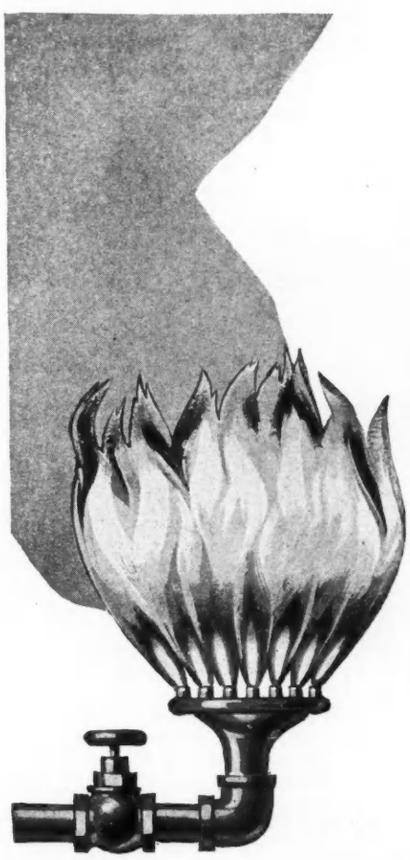
Outstanding features include a greatly increased range of spindle speeds from 12 to 1200 r.p.m.; feeds from ¼ in. to 60 in. per minute; a new, center-bearing spindle, with worm drive; a sponson-type knee, and a multiple vee-belt drive, with motor set at right angles to the spindle.

are provided, these being in geometrical progression, obtainable by a single lever in combination with a large, direct-reading dial.

Net weights of the Nos. 3 and 4 machines: Horizontals, from 8975 lb. to 10,050 lb.; verticals, from 9935 lb. to 10,525 lb.



TURN DOWN THE FIRE . . . Rezyl-type enamels bake at lower temperatures . . . . .



Cut oven temperature to 200° F. Give parts a one hour bake. This practice is regularly recommended for enamels formulated with Rezyls.

Rezyl-type enamels are tough and elastic. Their adhesion is excellent. Their high-gloss is durable. While 1 hour at 200°F is the minimum recommended, the longer Rezyl-type enamels are allowed to air dry or bake at low temperatures, the greater the adhesion and elasticity of the film.

The Rezyls themselves are opaque to destructive short rays of sunlight and impart this property to finishes in which they are used. Neither sun nor rain nor cold nor heat will check or crack a properly formulated Rezyl-type finish. This exposure resistance of Rezyl-type finishes makes them of utmost importance to the automotive industry.

There are Rezyls for practically every type of coating—for wood, metal, fabric, paper and leather. Improved finishes on all types of surfaces are assured, with desirable economies.

FREE—*An Important Booklet* containing test data and basic formulas. When writing, mention name of your lacquer maker.

Combinations of Rezyls 1102 and 113 are particularly adapted to finishing auto-frame or chassis parts. Our Technical Department stands ready to consult on special problems. If desired a representative will visit your plant to assist during the preparation of trial batches.

Industrial Chemicals Division

American Cyanamid Company

535 Fifth Avenue New York

NEW DEVELOPMENTS

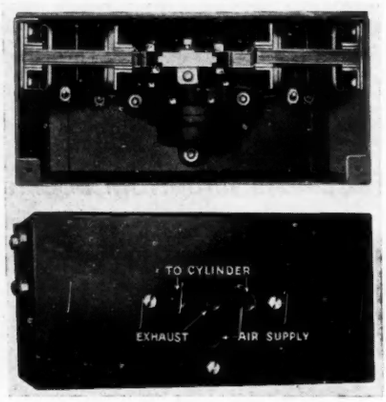
Automotive Parts, Accessories and Production Tools

in a tube which is threaded on the outside and screwed into a flanged fitting which is secured to the toeboard of the car by means of screws. A coiled spring inside the tube below the stem normally holds the latter in its highest position, and it is held rigidly in this position by a sector swiveling around the pin with the pad. A small wire spring holds the pad in an inclined position, and the sector then rests on top of the wall of the tube and prevents the stem from being forced into the tube by the pressure of the foot.

The foot rest is located directly behind the accelerator button. For small throttle openings the foot rest acts exactly like an ordinary rigid rest, except that the pad swivels. As the accelerator button is being depressed, the pad of the foot rest and the sector are swung around the pivot pin, and as soon as the whole of the sector is within the bore of the tube, the pressure of the foot will depress the pad, permitting of a more comfortable position of the foot.

Hannifin Valve for Remote Control

An electrically operated four-way valve for remote control of air cylinders on production machines has been placed on the market by the Hannifin Mfg. Co., Chicago. The Model E valve is available in two sizes, with ¼ or ½-in. connections.



It provides instantaneous push button control of air cylinders from one or more stations, and can be used wherever a manually operated valve is now employed.

The valve is operated by means of a double push button switch. Pressing the "start" button operates cylinder in one direction and pressing "stop" button reverses the cylinder. The cylinder is always under air pressure at one end or the other. The operation of the valve is instantaneous; therefore, only momentary contact of the push button is required. The circuit is closed only when one of the push buttons is depressed. This valve may also be arranged for automatic time cycle operation by means of an automatic time switch.

Two other valves complete the line. The Model C is recommended for applications of air cylinders to engage or disengage clutches on large machines. The Model D is designed for cylinders of 8-in. bore and larger, where the power stroke is to be held for a short period.

Standard Cutting and Welding Torch

Tips, Inc., Baltimore, distributors of standardized cutting and welding tips, apparatus and accessories, has added a new cutting and welding torch, the Milburn type NVM, to their line.

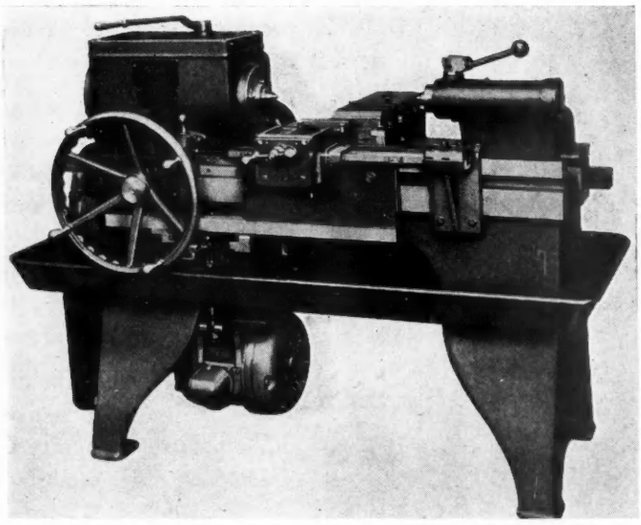
It is particularly suitable for strengthening frames, welding fenders and any cutting or welding work around the garage or shop; for welding broken bumpers, spring shackles, cracked blocks and other operations requiring a large-capacity torch.

This torch is improved in design and will cut or weld any thickness of metal within range of the process. Welds by mere change of tips.

The 90-deg. head is designed to take standard Type NV conical seated tips which have the same standard as those used in Airco Davis-Bournonville Cutting Torches, Styles 8000, 3000A, 3000B, etc.

Sundstrand Junior Stub Lathe

Brute strength, power and rigidity have been built into the Sunstrand Junior Stub Lathe to accommodate the widest use of cemented tungsten-carbide tooling. According to the Sunstrand Machine Tool Co., Rockford, Ill., makers of this machine, it has been designed both for small lots and quantity production. Capacity between centers is 18 in., swing-over tool slides, 8 in. diameter.



The machine has automatic control of spindle and feeds with spindle speeds varying from 128 to 3600 r.p.m., depending upon the size of the driving motor. Front carriage feeds 0.0015 to 0.042 in. standard. Front and rear bearings are anti-friction. The master control lever operates the spindle, feed clutches and brake.

Motor drive is optional as follows: 5 hp., 1200 r.p.m., spindle speeds, 128 to 1346 r.p.m.; 5 hp. or 7½ hp., 1800 r.p.m., spindle speeds, 195 to 2050 r.p.m.; 7½ hp., 3600 r.p.m., constant speed. The coolant pump is mounted at the side and driven by vee belt. Floor space required is 46 by 78 in. Net weight, 2050 lb.